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Electrical World

Electrical Development in Europe

By W. H. Onken, Jr.

Cleveland 66-Kv. Cable Joint

By H. L. Wallau

Service Interests Public More Than Price

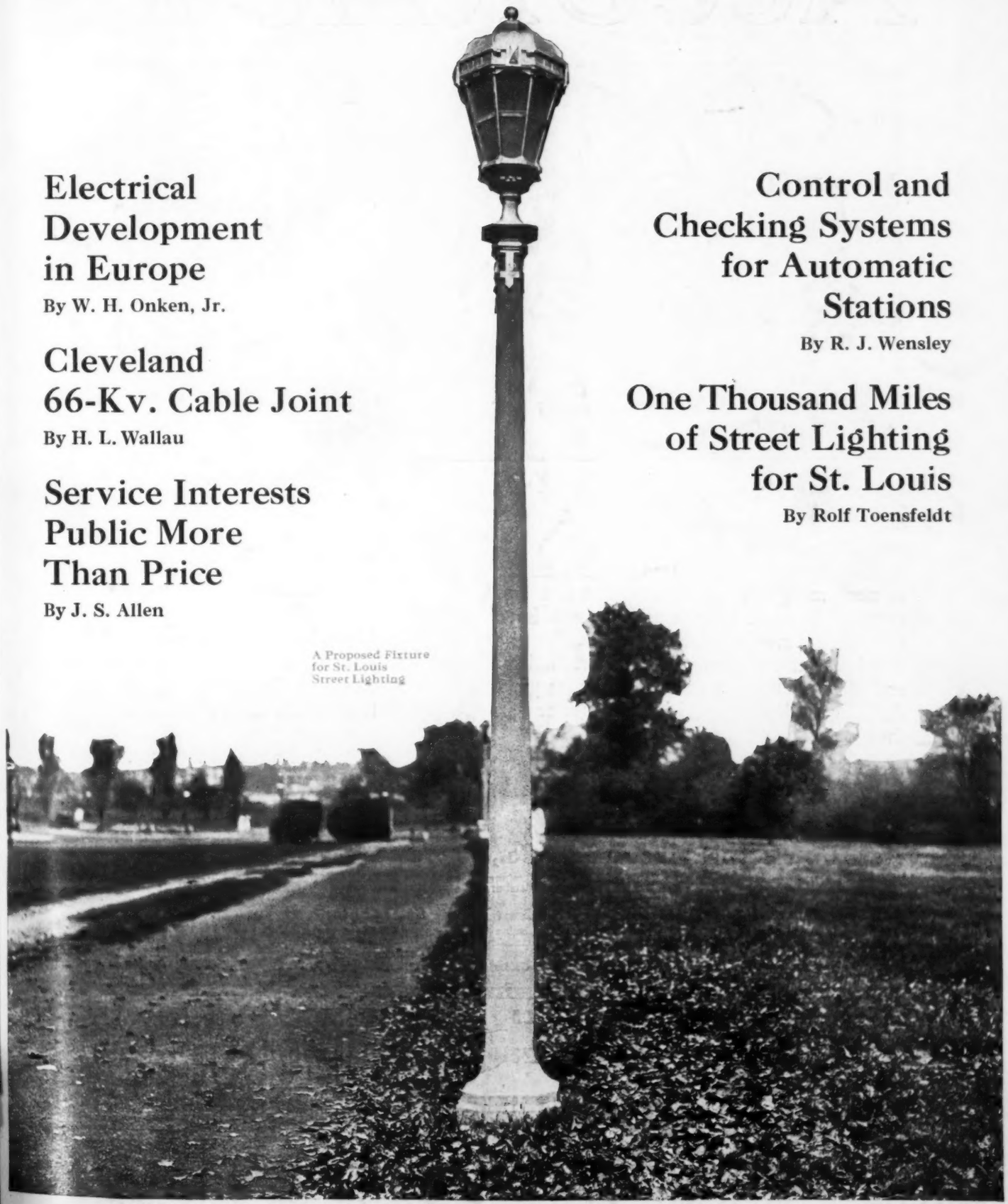
By J. S. Allen

Control and Checking Systems for Automatic Stations

By R. J. Wensley

One Thousand Miles of Street Lighting for St. Louis

By Rolf Toensfeldt



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The Unseen Audience

SOME time ago there appeared in the ELECTRICAL WORLD an article by Warren R. Voorhis, vice-president of the American Water Works & Electric Company, New York, entitled "The Girl at the Window." In an interesting, graphic style it pictured the influence on public relations of this young woman at the information desk.

A few months later in the monthly bulletin of the Oklahoma Gas & Electric Company there appeared a criticism of this article by a stenographer of that organization, and inquiry was made of General Manager J. T. Owens as to how it came to be written. He replied:

> My attention was first called to the article by Miss Van Sant, the girl at our information desk. After having read it, I called together all of the employees of our staff, both men and women, who come in contact with the public in the downstairs office, to discuss the article with them. I told them that I wanted each one to read it and then write me a personal letter giving me their reaction to the article.
>
> It is our regular practice to seize on articles of interest, either technical or having to do with public relations, and pass them along to members of our organization, with the request that they read them and make comments.

Mr. Owens inclosed a whole bundle of letters from women of his staff discussing "The Girl at the Window." No one could read them without being impressed with the tremendous power to make men and women think that lies within such an article. We are continually receiving such evidences that a particular article in the ELECTRICAL WORLD has been absorbed by an entire organization to which it brought a timely message of importance. The actual service and influence of the paper therefore reaches out far beyond the names on the subscription list to audiences unseen but vital to the industry.

Advertising Index—Alphabetical, 96; Classified, 90, 92, 94; Directory of Engineers, 38, 39; Searchlight, 40-52

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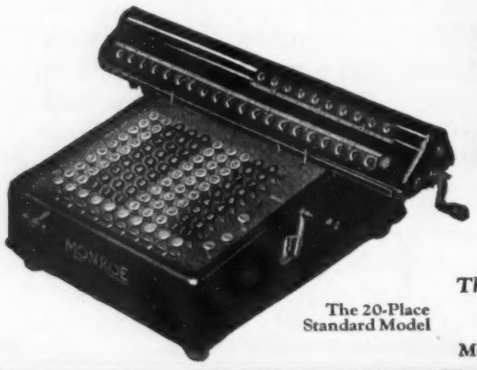

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Electrical World

The consolidation of Electrical World, Electrical Engineer and American Electrician

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W. H. ONKEN, JR. Editor

HAROLD V. BOZELL Editor

Volume 82 New York, Saturday, November 24, 1923 *Number* 21

Agreement Essential to Water-Power Development

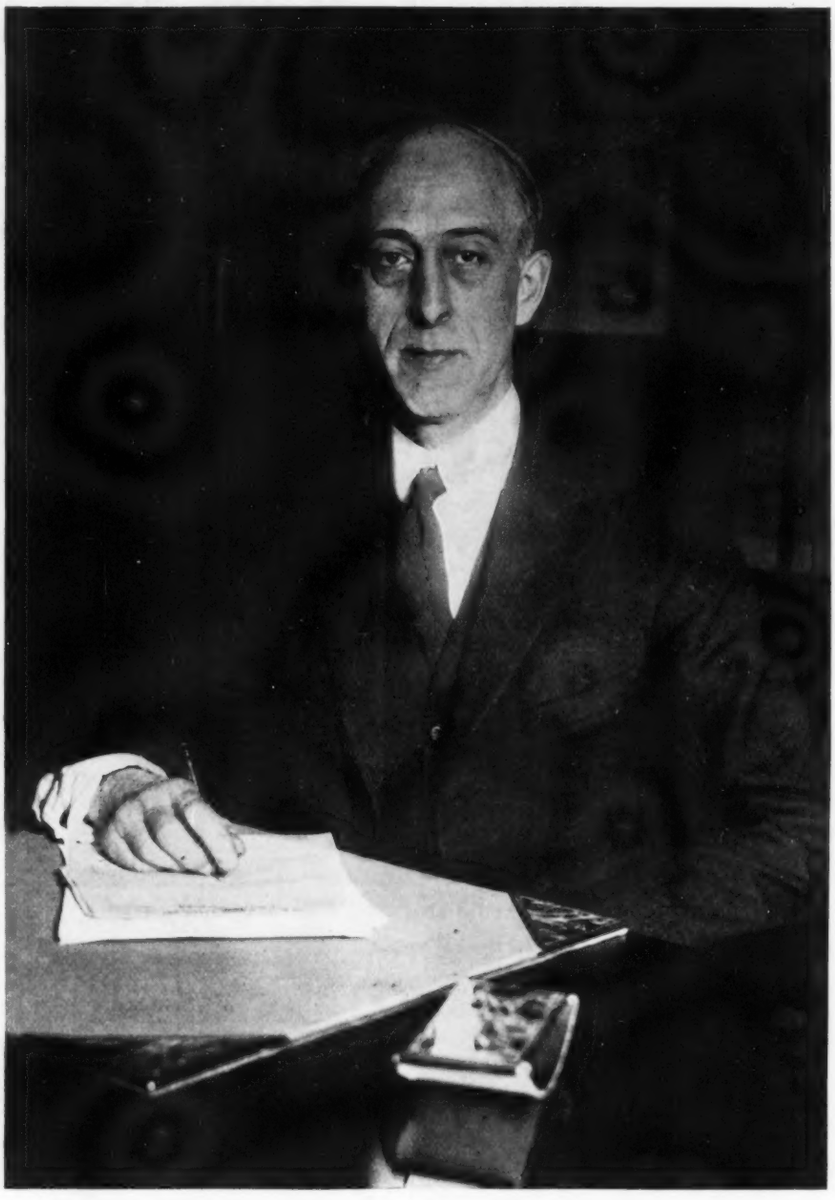
INASMUCH as water power must be an integral part of any superpower system, it is essential that the general public, and especially state executives, shall have a clear perception of the problem. So long as there is conflict between state and national authorities over supposed rights infringed or fancied powers usurped, so long will water-power development be stopped and so long will the people be deprived of the benefits accruing from water powers harnessable and utilizable.

To what purpose do the States of New York and New Jersey, for example, seek to restrain the Federal Power Commission from granting permits on navigable streams within their borders? Any development in either state is certainly for the benefit of the citizenry and is subject to the regulation of the state. It is the public which gains, not the Federal Power Commission, because the latter is not a profit-making body. If the venture is unprofitable, the owners and no one else stand the losses. Thus these contentions really withhold from the public something of benefit merely because authorities cannot agree on some minor details of procedure. There is no question as to the desirability of water-power development. On that point state and national governments are in agreement, and it is unfortunate that work of such essentially beneficial character should be held up while lawyers quibble and argue over trifles.

Any system of pooling the power resources of the nation must of necessity be interstate and must be based on a sound economic operating structure. Our present power development stands unrivaled. The men who are responsible for it are the ones who are now working out on an economic basis the power destinies of the country. Superpower is not for novices, but for men of experience and ability. Men possessing both are willing to erect hydro-electric plants which would be a credit to any state or nation. The public wants developments of this kind, and the public can have them if its officials will sanction what both agree is worth while and settle their differences in a way which will not deprive the public of the benefits of constructive work.

Dana Pierce

An engineer and executive who has contributed greatly in the field of safety promotion in which the development of the National Electrical Code has been the outstanding product.



FOUR things stand out in the history of the National Electrical Code during the past few years: Many progressive ideas have been incorporated which have tuned it closer to the spirit of the electrical industry. The establishment of the new developments committee of the National Fire Protection Association has provided a mechanism whereby the code may be more easily adapted to changing conditions. The 1920 code has been accepted as an "American standard" by the American Engineering Standards Committee. The 1923 code has been revised in a new form that adds greatly to its clarity and usefulness.

All this has very naturally attracted the attention of the electrical industry much more closely to the work which is being done by the Underwriters' Laboratories and the N. F. P. A. for the reduction of fire and life hazards from electrical causes. The man above all who personifies this work is Dana Pierce, for some years chairman of the N. F. P. A. electrical committee and vice-president of the Underwriters' Laboratories and now just elected president of the laboratories.

Dana Pierce was born in New Hampshire in 1871. Graduating from Amherst College, he became an instructor in Hotchkiss School, Lakeville, Conn., and while teaching took special work in physics at Harvard and Cornell. In 1899 he resigned from Hotchkiss and spent a year as a graduate student at Johns Hopkins University and then joined the instructing staff at Pratt Institute, Brooklyn. In 1906 he was placed at the head of the electrical department of the Underwriters' Laboratories. For six years he was in Chicago in charge of electrical and signaling work. In 1912 he established a testing station at New York while still directing electrical work at Chicago. In 1916 he was made vice-president of the laboratories. Meanwhile for many years Mr. Pierce had been prominent in the electrical work of the National Fire Protection Association, and in 1918 he was appointed chairman of its electrical committee, which has entire charge of the code. Later he was made secretary of the Electrical Safety Conference. In this time he has written much.

Mr. Pierce has been both the leader and the wheel horse in the work of developing the code. Possessing a rare ability to see clearly, with patience and sympathy, both sides of a question and then, using words that cannot fail to be understood, to interpret his opinions in logical sequence, he has long wielded a wide influence for progress. His poise as a presiding officer and the fairness of his judgment have contributed greatly.

Editorial Comment

Electrical World, November 24, 1923

Volume 82 Number 21

A Briton's Tribute to Our Industry

LLOYD GEORGE'S first utterance to the reporters who greeted him on his return to England was one of admiration for Canada and the United States. What apparently impressed the noted Welshman most, judging by the jubilant way in which he expressed himself about it, was the tremendous use made in this country of wireless and the opportunity it gave him to address unseen millions. The average Englishman is not so readily impressed. He does not comprehend the phenomenal growth of the electrical industry in this country or the extent to which people employ electricity in their homes, factories and shops, because he has not seen it. Every ingenious youngster here dabbles in wireless. We number our radio "fans" by the millions and sell radio parts in every five-and-ten-cent store. In England, however, the use of wireless is limited because the government has placed too many restrictions upon it. We imagine that if Lloyd George had his way all this would be changed. He saw and believed, he experienced and appreciated what electricity can do. Two years from now a large party of English engineers and commercial men expect to visit this country to see its electrical developments. Every opportunity will be given them to study electrical conditions and applications so that when they return to England they too may be just as enthusiastic over the possibilities of electricity as Lloyd George was over wireless. Then increased development may be looked for, and if a friend at court is needed to help remove some barriers, the industry there ought to find him in the doughty ex-Premier, who left such a wonderful impression and who in turn was himself so visibly impressed.

Bringing Gifts to the Modern Crœsus

THE wealth of old King Crœsus was so great that people used to say "as rich as Crœsus." Of course, that was before the days of Henry Ford. And yet what a pity it is that people interpret "To him that hath shall be given" so literally that they would like to present to Mr. Ford such valuable gifts as power plants or such high honors as the presidency of the United States. Usually a man possessing the wealth of Mr. Ford is made miserable by persons seeking favors and gifts of money, or by inventors and promoters who want to heap further riches upon him by letting him in on the ground floor, but only in return for capital advanced, or by enthusiastic dreamers who with his assistance can convert this world into an Elysium. We can account for the diverse motives impelling all these supplicants, and so can Mr. Ford, we dare say. But when it comes to placing free and stringless gifts on silver platters at his feet, asking him to play the rôle not of giver but of receiver, we are lost in amazement. And yet that is what a Congressman seriously proposes to do. The government having sold the steam plant at Muscle Shoals and having thereby caused Mr. Ford to become somewhat peevish, it is proposed to spend more good money on another steam plant so that the Muscle Shoals project shall be just as attractive as ever. Of a truth this world possesses many queer inhabitants; but fortunately there is enough sanity left in it to keep it attractive still and a place worth living in, even though shared with demigods and demagogues.

The Three "Urges" in Man— To Know, to Think, to Act

THE most coveted award in electrical engineering, the Edison medal, was presented this year not to a practical pioneer, like Brush, Bell or Sprague, but to a pure physicist, Prof. R. A. Millikan, formerly of the University of Chicago and now on the staff of that rising scientific center on the Pacific Coast, the California Institute of Technology. In a masterly response, after the presentation of the medal at the recent A. I. E. E. convention in California, the new medalist brought out in a striking manner the relationship of pure science to engineering and to all practical activities as well. He spoke of the great primitive "urge to know," which from the earliest days of humanity has prompted observation of physical facts and exploration of unknown regions, in spite of great obstacles and hardships. The knowledge so acquired dispelled superstition and led to new ways of thinking.

The way men think, according to Professor Millikan, is the most important and practical thing in the world, because the things they accomplish and the manner in which they act are largely determined by their thinking. This is then the newly expressed connection between pure and applied sciences: The urge to know leads to scientific discoveries; these discoveries change man's ways of thinking, and the new attitude toward the world causes men to build bridges and to put up transmission lines, so as to be nearer their fellow men.

Hartford Scores a Commercial Triumph

TO "SIGN UP" more than 25 per cent of a city's wired homes for improved kitchen lighting in a month's campaign—in other words, to place seven thousand 150-watt lamps in circuit, with an estimated gain in annual revenue of $55,000—is no small achievement. It arouses both admiration and enthusiasm. Such was the record of the Hartford Electric Light Company in October, and the end is not yet. The story is told elsewhere in this issue.

The results speak for themselves, but a few words upon methods may not be amiss. The Hartford experi-

ence clearly emphasizes the importance of careful advance planning of procedure, the vital necessity of picking high-grade canvassers to meet the public, the value of intensive and original local advertising, and the appeal of a demonstration contrasting old and new methods to the utter disadvantage of the former. Unquestionably the fact that Hartford's two-part residence lighting rate carries an energy charge of only 5½ cents per kilowatt-hour was a most favorable factor in selling the public a 150-watt unit. The deferred-payment plan was naturally an essential part of the scheme. And too much emphasis can hardly be laid upon the importance of arranging for a flexible and an adequate supply of material in view of the snowballing of the popular demand in the Hartford case.

There is a public-relations angle to such a campaign, however, which deserves recognition. The use of salesmen of superior quality and provision for meeting the popular demand for installations with speed and courtesy, involving thorough local organization, co-operation between manufacturer, jobber, central station and dealer, are all cardinal points in such a drive. When the campaign began it was hoped to sell five thousand units in three months. That the electrical interests concerned were able to expand their facilities to meet a demand rate something over four times that anticipated speaks well for their internal and external co-operation, and the industry is to be congratulated upon the achievement of the Hartford company and its associates.

Flexible Rates and Adequate Financing Needed

LOOKING a short way into the future, W. B. Clarkson made two rather important points in his address last week before the West Virginia Utilities Association. In his opinion a situation requiring serious study is the necessity for adequate earnings in the future. Rates at present are based largely on pre-war investments, yet the enormous expansion of utilities has resulted in a great investment in equipment under post-war conditions. In a few years, therefore, the major position of a utilities investment based on financing cost, material cost and labor cost made under peak conditions will be fixed, and a very serious problem will be encountered unless rates can be made to return earnings on this investment, even though investment costs in the future should greatly decrease.

Another problem to be faced as a future condition is based on the oft-mentioned fact that utilities are under obligations to meet the demands for service when they occur. The very rapid growth in service demands today means that the utilities must obtain a large amount of new capital each year to provide adequate service facilities. The magnitude of capital requirements even now is great, and yet the need will be doubled every five or six years if the present rate of expansion is maintained.

Fortunately, both these problems depend for their solution upon hand-in-hand work by the utilities and the public because of their unity of interest. Good public relations are a fundamental in the utility business and have as their cornerstone good service supplemented by publicity, customer ownership and the co-operation of employees. The future should give no cause for alarm so long as the facts of the utility business are understood by the public.

Lighting an Entire City Presents Interesting Problems

IT IS indeed fortunate, as Rolf Toensfeldt remarks in his article in this issue, that the city of St. Louis has made it possible to approach the problem of street lighting there as a city-wide and all-inclusive undertaking. No illuminating engineer whose business is street lighting could desire any greater opportunity, provided there are no "provisos" to limit exercise of his professional discretion. As to the degree of perfection attained by any one engineer, varying opinions from other engineers might, of course, be expected. But all would admit that the problem was presented on a desirable basis. The magnitude of the work of lighting one thousand miles of street in one job, of expending nine million dollars wisely and in a way to give public satisfaction and render effective service economically, is immediately admitted.

The basis of the solution which Mr. Toensfeldt presents will undoubtedly meet with general approval. That greater intensity should be used in the business districts than in outlying sections is natural. The manner of its portrayal by map is at once effective to the engineer and useful for public information. The debate on the solution will doubtless center on three principal points—one, the intensities used; two, the selection of units, and, three, the method of distribution and control.

It has not been long since there appeared a calculation of what cities should be expected to spend for street illumination. If memory serves correctly, the intensities there recommended as good practice were considerably above those determined upon for St. Louis. This does not mean that the St. Louis intensities are not a great advance in general street illumination practice. But it does indicate either that cost is still unfortunately too much a controlling factor or else that the knowledge with reference to the effectiveness of higher illuminating intensities spreads slowly. On the question of units selected manufacturers of competitive products will probably have reasons to show why the best has not been chosen. But if the one mentioned by Mr. Toensfeldt is finally installed for the production of the different intensities proposed, it will provide a demonstration which all illuminating engineers will be eager to study. To say the least, it is a courageous departure to equip a thousand miles of streets with a newly designed unit which has not seen extensive field trial, and it is to be hoped that this bold move will be followed by successful performance.

The decision of the city of St. Louis not "to tie in too closely" with the service company's feeders because the service company is not one and the same as the agency owning the lighting installation, the city, may provoke comment from the central-station industry. The determination has been made largely from a continuity-of-service standpoint. The position of the local electric company on this question is not known, but surely the light and power industry in general must rise to the challenge as to continuity and dependability of service. Among all the factors of its service of which the central-station industry is most proud and jealous, its policy and record on continuity of service are conspicuous. As Mr. Toensfeldt says, multiple distribution for street lighting is now both dependable and economically justified. It would have been at least a fitting experiment, in line with the boldness and the

apparently good engineering of the rest of the program, to have installed a multiple system.

The St. Louis undertaking is bound to attract the attention of illuminating engineers, of central-station executives and commercial managers and of city officials in general. On account of its magnitude its various features will have more than usual interest, and while, as already indicated, there may be debate on some points, there will undoubtedly be general approval of the plans as described, and judgment will be based only on actual performance.

Limiting Factors in Distribution Transformer Service

THE question has been raised in informal discussion whether overemphasis has not been laid upon temperature rise as a factor limiting the application of distribution transformers to service in residential districts. It is averred that voltage regulation is the controlling consideration in many installations rather than temperature, and that modern transformer design and construction have reached a plane of service reliability that warrants dismissing the heating problem from the serious consideration of central-station engineers in assigning the later products of the factory to field service. Without attempting a categorical discussion of this point at the moment, it is well to realize the increasing importance of studying transformer applications in neighborhoods with rapidly changing or growing loads, of taking periodical engineering inventories of loading conditions, determining the existence of excess capacity and the possibility of utilizing it elsewhere, and checking the quality of service rendered to consumers making more and more use of appliances and higher-powered lamps.

Much splendid work has been done along the line of studying diversity factors; some excellent methods of inventorying transformer duty are available, and the possibilities of forcing the output of fairly old transformers are by no means exhausted. If the experience of operating companies generally shows a marked diminution in the importance of temperature rise as compared with regulation capabilities, it would be of interest to the entire industry to establish the facts under differing conditions.

Why Not Publish a List of Stockholders?

NOT long ago a writer in one of the prominent weeklies asked the question, "Why not publish lists of stockholders?" One of the important banks of Boston had just taken this courageous forward step. It has published a complete list of its stockholders so that every one can see and know who own the bank and thus appreciate what kind of people believe in the institution to the extent of investing their money it it. There could not be a better index to the character of the bank.

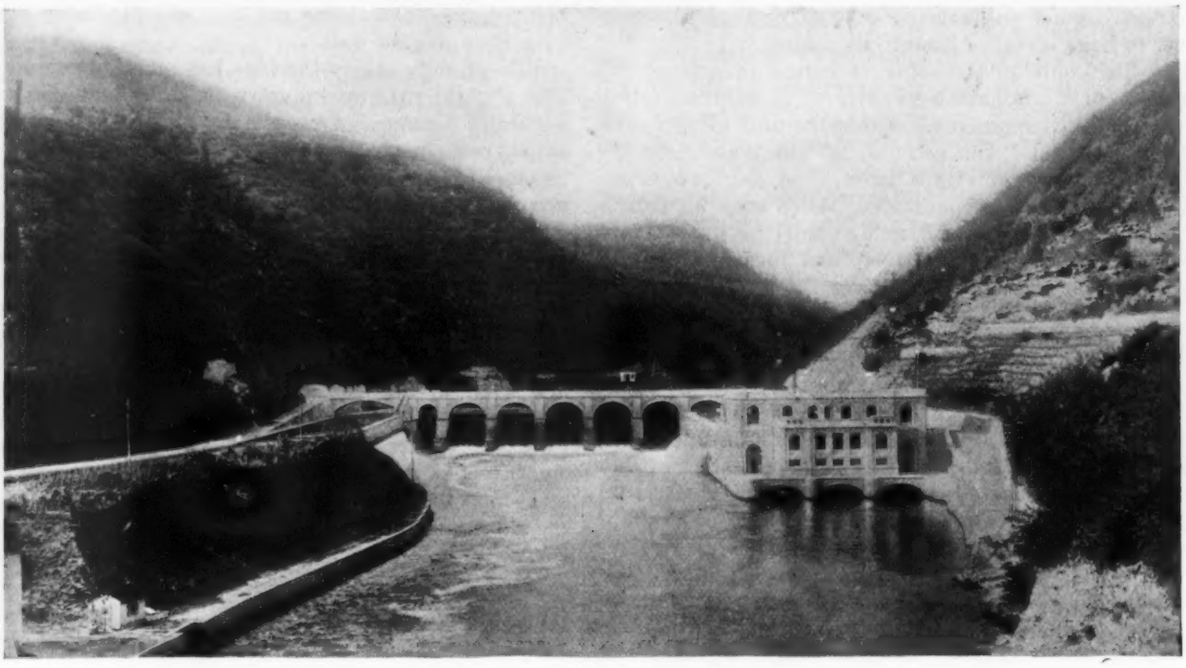
Gradually, albeit slowly, we work up out of the darkness. Time was when most business was conducted in profound secrecy. "That's my business" is a phrase that indicates the degree of privacy that was imposed. But most of those hobbles have been shaken off until today corporations and their customers have begun to act like friends. It has become quite common to publish how many stockholders there are and even to go into particulars as to what kind of people these stockholders are. Then why not take the final step and tell *who* they are as well?

For a public utility the idea has much to commend it. The electric railway industry is right now conducting a publicity campaign that is featuring photographs of employees shown at their work, with the statement: "I am Bill Smith of the Podunk Street Railway. When you talk about the electric railway, that includes me." It is a very human appeal. Naturally, it would not be appropriate or necessary to tell how much money stockholders have invested in a company. That is their affair. But a list of the names of those who own the securities of a central-station company would be mighty interesting reading for the stockholder himself and a powerful defense against the raiding politician. Publish these names and tell the stockholder, "When they say things against your central station, that includes you!" and he becomes possessed of a new sense of responsibility to his company. It is one more thing to do to give personality to the public service corporation.

Division of Engineers by Functions Instead of by Subjects

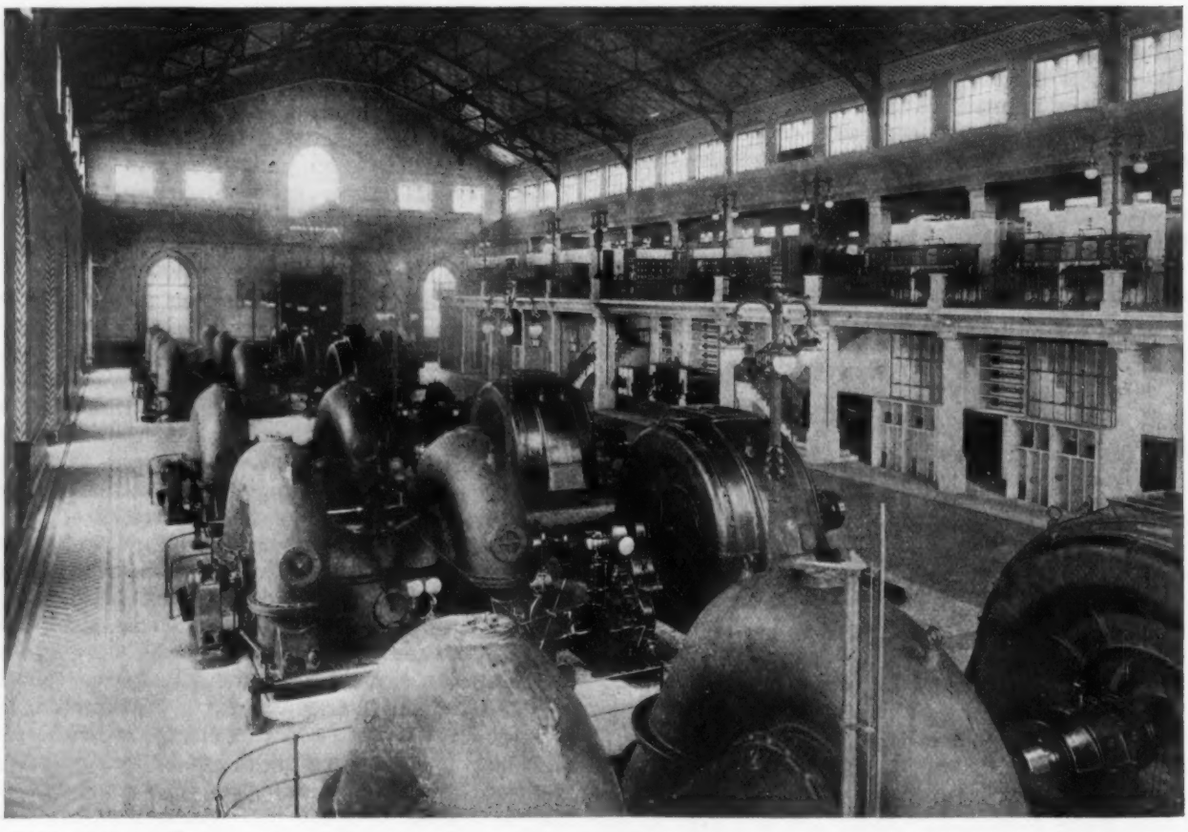
NEW brands of engineers are being created all the time—for example, radio engineers and acoustic engineers—to recognize new and growing branches of our art. These subdivisions in most cases refer to the purely external and specialized forms of activity rather than to the psychological, deeply seated functional aptitudes of the mind. Thus a man who loves construction work will enjoy erecting bridges as much as putting up transmission lines or building sugar refineries. He is a construction engineer by temperament, rather than an electrical, a civil or a chemical engineer. Similarly, a born designer will be just as satisfied designing gas engines as designing induction motors, his specialty depending upon the training that he happened to get. A good sales engineer can handle various kinds of products with almost equal success. Therefore, instead of dividing engineers into civil, mechanical, electrical and so forth, it is more rational to pay more attention to their specialization into designers, production engineers, operating men, sales engineers, executives, researchers, etc.

This is not a purely academic question of nomenclature, but one of properly directing young men where they can be most useful. It is almost impossible to say whether a normal, healthy and intelligent young man will make a better civil or mechanical engineer, granted a thorough training as either. It is much easier to predict whether he will like construction work or sales, management or research. Perhaps the day will come when college training will be available more in accord with these fundamental propensities of men, and not according to purely secondary "brands" of engineering. An intimation of such a trend is seen in a recent article by Prof. Edward Bennett on functional divisions of engineering (*A. I. E. E. Journal*, 1923, Vol. 42, page 1145) and also in a monograph on engineering research as a career by Dean A. A. Potter (published by the National Research Council, Washington, D. C., October, 1923). After all, the change is not so radical as it may appear at first sight, and by a slight readjustment of courses in the junior and senior years each man may be allowed to follow more freely his natural trend of mind.



Power Plants of Milan Edison Company

THE Adda River, canalized centuries ago by the Italian engineer and painter Leonardo da Vinci, has been further utilized by the Milan Edison Company. Three hydro-electric stations on the river supply electrical energy to Milan and other cities of northern Italy. The upper picture shows the Calusco station, rated at 3,000 kw., and the 35,500-kw. Robbiate station is shown below. These stations supply energy to a great industrial section of Italy.



KINGSWAY, LONDON, ONE OF THE CITY'S CHIEF THOROUGHFARES, LIGHTED WITH HIGH-PRESSURE GAS

Electrical Development in England

Observations and Analysis of Electrical Conditions Made by W. H. Onken, Jr., Editor of the "Electrical World"—Handicaps Under Which Great Britain Is Struggling and Plans for Co-ordinating Electricity Supply in Numerous Power Districts

AN AMERICAN electrical engineer passing along the streets of London, or for that matter through any other part of Great Britain, would appreciate the feeling which St. Paul must have had as he walked through the streets of Athens up to Mars Hill and found the altar with the inscription "To the Unknown God." For it would appear, with evidences of gas lighting on all sides (and excellent gaslighting it is), that electricity is almost, but not quite, as unknown in Great Britain as the Christian's God was in ancient Athens. But just as the Athenians erected an altar to a dimly comprehended deity, so in Great Britain evidences of aspiration for better electrical service are to be seen. The demand, already vocal, is growing in volume. It bids fair to become so insistent and vociferous that the electrical industry will find it no easy task to satisfy the clamor.

Industry Throttled at the Outset

That the use of electricity in Great Britain will ever approach the record reached in the United States is hardly to be expected, because the generation and distribution of electricity there is for the most part in the hands of municipalities, and as we have reason to know in the United States, that is a severe handicap. Government has never shown the same enterprise and initiative in encouraging the use of electricity as private corporations have done, and in Great Britain the situation is even worse than elsewhere, because the government has deliberately placed obstacles in the path of the electric light and power industry and greatly handicapped its progress.

The basic legislation of 1882 governing the establishment and operation of electric light companies was framed at a date when the generation and distribution of electrical energy on a commercial scale was still in an experimental stage. And, as though that were not bad enough, the companies were expressly prohibited from associating themselves with any other company or persons supplying energy under any license, order or special act. Under such circumstances, and in view of the competition of the gas industry, the progress made by the electric light and power industry in Great Britain has been less rapid than in other countries. Thus, in twenty-six years, from 1888 to the outbreak of the European war, the largest output in any one year from the whole of the electric generating stations in the United Kingdom (numbering over 500) amounted to about 2,000,000,000 kw.-hr., which is less than one company in Chicago now generates; and the present estimated output for the United Kingdom is approximately 5,000,000,000 kw.-hr., or less than the total amount of the electricity generated in the metropolitan district of New York. The United Kingdom has approximately 45,000,000 people and the metropolitan district of New York 7,000,000.

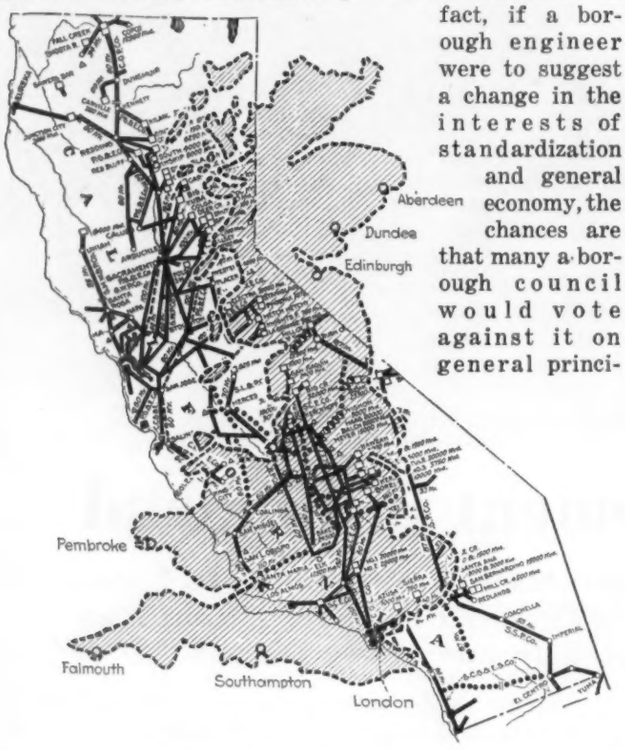
The advantages of the regulatory system which obtains in the United States are therefore instantly apparent. Here public utilities are regulated monopolies and combine the zeal, energy and initiative of private enterprise, encouraged to do its best and restrained only in matters of service and rates and in the prudent use of capital.

Serious Lack of Standardization

The one great drawback to the wider and more intensive use of electricity in Great Britain, however, is the lack of standardization, and until this is remedied great progress is impossible. The Britisher recognizes that there should be regularity in the sizes of hats,

shirts, collars, underwear, screws, nuts and bolts, but when it comes to the voltage and frequency of his electric supply, he has thus far evinced no interest, because the industry itself has shown none.

Those whose business it is to provide service oftentimes encourage variety in the mistaken idea that it provides security, particularly of jobs, and that too great uniformity and efficiency would be suicidal. In fact, if a borough engineer were to suggest a change in the interests of standardization and general economy, the chances are that many a borough council would vote against it on general princi-



GREAT BRITAIN AND CALIFORNIA

The former has 40,000,000 more inhabitants than the latter and comprises one of the greatest industrial districts in the world. Its electrical output, however, is no larger than California's, and while Great Britain is planning restricted power districts made up of interconnected systems, California already possesses an interconnected network stretching from one end of the state to the other. The maps are drawn to the same scale.

ples. The experiences of Great Britain's electricity supply commission show that it is almost as hard to get agreements on questions vital to the growth and expansion of the electrical industry as it is "for a camel to go through the eye of a needle."

Confronted with almost as many varieties as a dog has fleas, the manufacturer is also in a dilemma. Big production is out of the question; distribution of supplies is difficult; stocks are as numerous as the stars, so that costs must necessarily be higher.

LONDON'S VARIETIES

The largest city in the world offers an excellent example of what electric supply ought not to be and serves as an illustration of the complexity of the electric light and power industry in Great Britain. In the area of Greater London alone there are some seventy generating stations, representing between them fifty different systems of supply, twenty-four different voltages and ten different frequencies. London is asleep. It knows, but knows not that it knows, and therefore needs to be awakened. There is no telling what the outcome will be when that awakening takes place, for the city's bankers are rich, its artisans skillful, its engineers excellent, and its public utility operators the peers of any in the world. But there is class to be reckoned with, tradition to be overcome and comforts to be appreciated.

There is too much worship of the past in Great Britain. The country is filled with and handicapped by ancient monuments. If it be a weakness to preserve the monuments, it is a weakness that yet deserves praise; but there is no justification for the handicap, for it is possible to preserve the monuments and at the same time remove the handicap. And that lesson is being surely although slowly learned. The inevitable outcome of independent development is apparent in the existence of many hundreds of comparatively small generating stations supplying electricity to restricted areas and operating at different voltages and frequencies. Even the interconnection of adjoining electric light and power systems for the purpose of mutual assistance and interchange of energy is often technically difficult or financially impracticable.

The accompanying map of a section of London, on which is indicated the location of the various generating stations, and the table giving the statistics on these stations are worth pondering. A look at both reveals wonderful opportunities economic as well as engineering, and yet a well-known Chicago utility operator who had excellent plans for remedying the situation received scant thanks for his trouble and was out of pocket a considerable sum of money besides. His proposition for a huge power station in the lower Thames based on sound economics and engineering, and which if accepted would have been a boon to the users of electricity in London, was put into the form of a bill which got as far as a second reading in the House of Commons and then was done to death by the very industry in whose interest he was working.

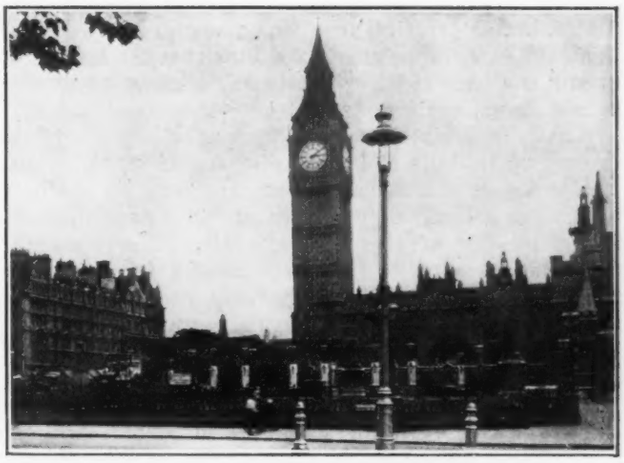
Of course, it is now recognized as one of the lessons learned during the war that the lack of co-ordination in the electric light and power industry of Great Britain has resulted in unnecessary expenditure of capital, wasteful consumption of coal and generally higher charges for electricity than would have been the case had there been larger areas of supply, a greater concentration of generating plants in large units and more economically situated power stations.

The need for improvement and for the development of a comprehensive system of generation, transmission and distribution has resulted in the appointment of elec-

STATISTICS ON SOME OF LONDON'S CENTRAL STATIONS

Municipal Plants	Station Rating, Kw.	Yearly Output, Kw.-hr.	Load Factor, Per Cent	Average Price Obtained—Cents
Battersea	12,350	12,323,573	25.43	5.06
Bermondsey	7,800	7,002,215	23.64	6.60
Fulham	6,850	8,686,294	24.18	6.22
Hackney	18,200	17,426,605	17.65	4.46
Hammersmith	10,300	15,262,130	17.73	5.52
Hampstead	5,950	7,437,695	19.76	10.18
Islington	9,125	11,665,601	15.06	8.18
Poplar	16,000	22,526,506	26.51	3.86
St. Marylebone	27,000	24,218,918	17.39	6.74
St. Pancras	10,300	13,557,768	19.35	8.14
Shoreditch	9,080	10,739,150	17.97	5.86
Southwark	3,300	2,928,269	16.44	9.06
Stepney	16,000	27,888,661	25.61	4.28
Stoke Newington	1,217	1,184,281	16.06	10.58
Private Plants				
Brompton	5,400	5,236,675	25.83	10.56
Central	25,000	39,857,690	20.22	3.04
Charing Cross	34,100	39,417,563	24.54	8.08
Chelsea	3,400	5,268,420	20.10	11.14
City of London	42,000	42,605,947	18.86	7.86
County of London	.....	58,241,758	.....	7.08
Kensington	1,070	7,506,015	25.28	9.16
London	51,800	49,675,886	26.11	3.50
Metropolitan	20,000	29,624,044	24.30	8.68
Notting Hill	3,500	4,074,512	23.74	11.90
St. James	11,550	13,464,418	16.68	8.46
South London	.....	10,532,615	.....	7.06
South Metropolitan	20,000	20,705,387	.....	5.02
Westminster	30,924	26,688,671	17.43	7.54

EBB TIDE PROBLEMS ON THE THAMES



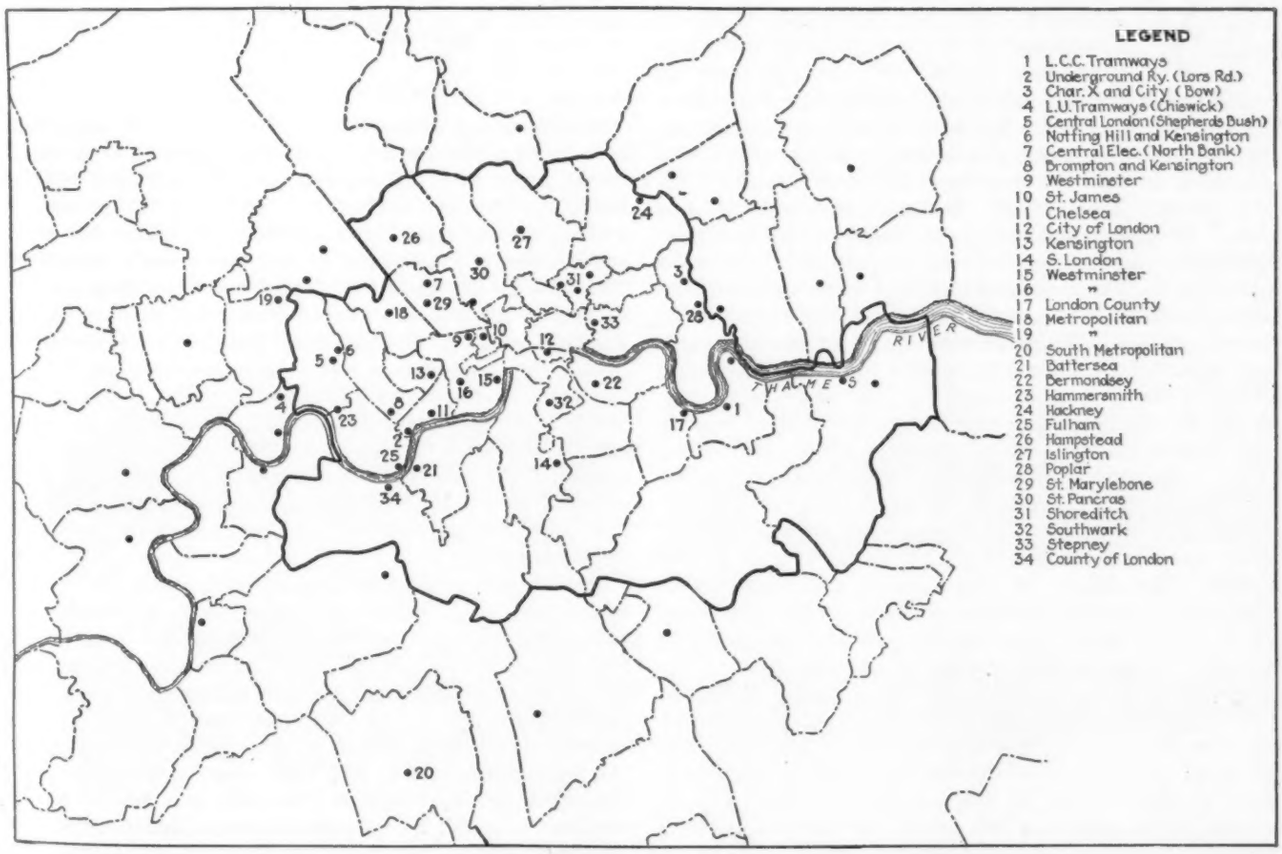
PARLIAMENT SQUARE IS LIGHTED WITH GAS

tricity commissioners with certain statutory powers and duties. The commission, which is composed of high-grade men of experience in the electric light and power industry, is deeply sensible of its task.

To develop a comprehensive and standardized system of generation, transmission and distribution on the basis of present-day knowledge and technical practice would be an easy matter, but there already exists an extensive and heterogeneous development representing the unco-ordinated growth of years and an expenditure of vast sums of money. Moreover, there is a multiplicity of interests involved, and it is necessary to secure the co-operation and agreement of those concerned in a given district concerning any scheme of reorganization of the supply of electricity.

Even after the engineering problems have been solved, financial considerations offer a barrier to the speedy development of the various schemes in different parts of the country. Experience had also indicated many legal handicaps which must be overcome before any great progress can be shown. Despite the handicaps, however, the electricity commissioners are making headway.

Unfortunately, there are in all countries dreamers whose eyes are fixed everywhere but on the earth and whose habitat should be Utopia. These men would like to wipe out the many hundred generating stations in Great Britain and replace them with a dozen or more superpower stations of huge size and unprecedented efficiency. We should like to do the same in the United



MAP OF LONDON WITH LOCATIONS OF POWER STATIONS INDICATED

States, but as practical men we know only too well that there is a limit to the amount of junk that can be bought at any one time if a corporation or community desires to remain solvent.

What the electricity commissioners of Great Britain are trying to do is to bring order out of chaos, to discard what is useless and inefficient, and to evolve a workable scheme of co-ordination in power districts in the interest of ultimate unification of systems and an abundant supply of electricity. So far as future work is concerned, the task of the commissioners is quite simple. No new generating station can be built and no existing generating station can be extended without their permission. Their chief difficulty is to rectify the mistakes of the past, utilize what is at present in existence, and evolve a standardized system without jeopardizing investment or running foul of innumerable legal, technical and financial pitfalls.

From a physical viewpoint, however, the situation in Great Britain presents less difficulty than would be normally met here. The country is small and compact; the density of population and service is greater, and since all of the energy must be generated in steam stations, the possibilities for the unification of distribution networks and the improvements of steam-station efficiencies are enormous. Greater progress would be made, however, if wider powers were granted to the electricity commissioners. The machinery at present set up for getting the municipal as well as private plants to pull together without too much disturbance of the principle of local self-government and in accordance with a well-defined plan is rather cumbersome. Joint boards made up of representatives of municipal as well as privately owned systems have so large a membership as to make them unwieldy. A single responsible administration would be more likely to get results quickly and efficiently than a town meeting of local authorities. However, it is a condition and not a theory which confronts the electricity commissioners, and, all things considered, they have done remarkably well.

The Cleveland 66-Kv. Cable Joint

Investigation and Extensive Tests of Wrapped Joints and of Joints Insulated with Tubes and Compound Resulted in the Adoption of a Combination Joint as Best Adapted to Service Conditions

By H. L. WALLAU

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WHEN designing the new 132,000-volt transmission line between Cleveland and Akron, the Cleveland Electric Illuminating Company was faced with the problem of carrying the line through thickly settled urban territory for a distance of about 8 miles. Since it was obviously impracticable to carry the 132,000-volt overhead construction through this territory, it was determined that underground cable of the highest practicable voltage should be used. Accordingly a 500,000-circ.mil single-conductor lead-covered cable to operate at 66,000 volts was chosen. The cable specifications were so drawn as to permit each cable manufacturer to use the technique he considered best. While the making of satisfactory cable was regarded as a manufacturer's problem, the design of a satisfactory cable joint, on the other hand, was purely a local problem, since even the manufacturers had no data on joints at all approximating this voltage.

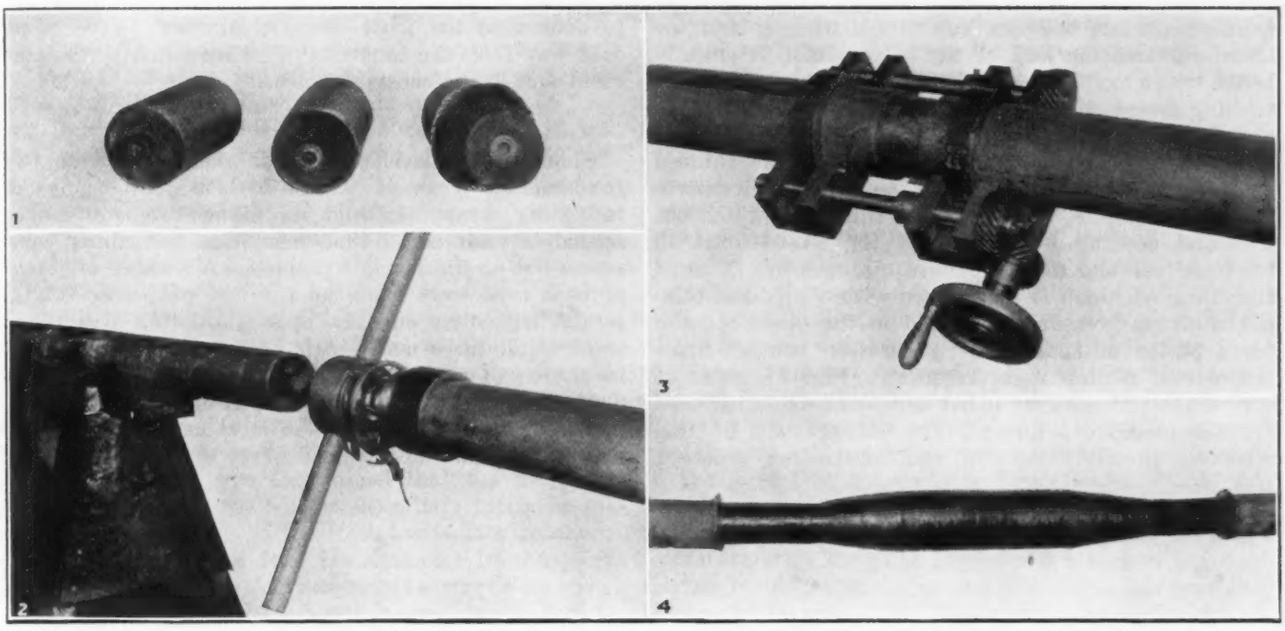
The joints now being made in Cleveland are the result of systematic research work covering a considerable period of time. There will be more than 900 of these joints on the two three-phase circuits to be installed. The details of their design and construction show many radical departures from joints heretofore used. Use is made of a combination of a wrapping of impregnated paper tape and a shellac-paper tube. This type combines many of the advantages and eliminates some of the disadvantages of either type of insulation used separately. In starting the joint the lead and paper of the cable are removed by a square cut which exposes about ¾ in. of the conductor. This step is shown in the sample at left in Fig. 1. By the use of a special cutting tool designed for this purpose the paper insulation is then undercut at an angle of 15 deg. from the axis of the cable (Fig. 1, center) leaving a conical space next to the conductor. How this work is done is shown in Fig. 2.

SPECIAL CONNECTOR USED

A thin brass shell made in the form of a truncated cone is next placed in each cavity. This shell is made in the exact form of the sloping paper surface, having holes provided for use later in sweating the connector and filling the shell with solder. The conductor ends are inserted in the ends of an ordinary copper connector. The two cable ends to be joined are then crowded together by the use of a geared device designed and built for this purpose, illustrated in Fig. 3. This operation brings the cable ends together in true alignment, fitting the ends of the brass shells closely. By pressing the shells so tightly against the sloping paper surfaces no air is entrapped between the brass surface and the paper of the installation. The copper connector is then sweated at a high temperature, and the entire conical space within the cones is filled with solder at a lower temperature.

On account of the short truncated form of the conical brass shell a portion of the solder comes in direct contact with the paper of the insulation. It was found that the hot solder can be poured against the paper with no undesirable effects, while the use of a full conical shell was found to introduce difficulities due to entrapped air. This results in a metallic connector for the conductor, which has the same diameter as the factory-made insulation of the cable and has no sharp corners. As will be pointed out later, this reduces the stress on the surrounding insulation at this point.

The lead armor is then removed for a distance of



FIGS. 1 AND 2—MAKING THE JOINT

In preparing the cable joint (A) a square cut exposes about ¾ in. of the cable when the insulation is undercut at an angle of 15 deg. (B) by the tool shown in Fig. 2. To lower excessive stresses at the lead sheath the ends are belled up as in (C) to allow for a better contact between the candle wicking and the sheath.

FIG. 3—DEVICE FOR JOINING CABLE ENDS

Pulling the copper connectors together in true alignment is accomplished by this device. It is clamped directly onto the cable, which operates by means of two gears.

FIG. 4—APPEARANCE OF INCOMPLETE JOINT

18½ in. from each side of the center of the joint. A winding of impregnated paper tape extending for 12 in. each way from the center is then applied to a thickness of ¾ in. in the central 13 in. and tapering to the cable insulation at the ends. The appearance of the joint at this stage is shown in Fig. 4.

TAPE IS MACHINE-WRAPPED

Before any cable was available or any general procedure determined it was conceived that any narrow insulating tape used in a joint might be wrapped by machine to obviate the objections to hand wrapping—i.e., the lack of uniformity in laps, uneven tension and the excessive inclusion of air and moisture. Such a machine (Fig. 5) was used throughout the experiments, and similar machines will be used to apply all tape in the service joints. This machine is built in such a way that it can be easily operated in a standard manhole and can work within a space of 6 in. between the cable and the wall. It also permits the application of compound over the successive layers of tape at a temperature above the boiling point of water. Over this is slipped a shellac-paper tube large enough to clear the maximum diameter of the tape wrapping by ⅜ in. This is held rigidly in place by spacers placed between the tube and the tape wrapping; it is also centered in the outer sleeve by spacers cut from the same diameter tube as shown in Fig. 6.

The outer sleeve of the joint is constructed of brass and is 8 in. in diameter at the center. It is made in two sections, which telescope together at the center, one being slipped over each end of the cable before any jointing work is done. Experiments showed excessive stress on the insulating compound in the angle where this sleeve joins the cable sheath. This difficulty was overcome by filling this space with a wrapping of cotton candle wicking which has been previously impregnated by a vacuum treatment. In order to secure

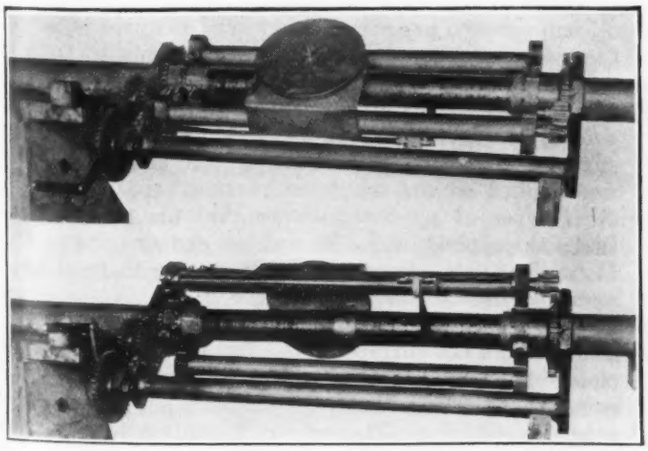


FIG. 5—THE 24-IN. TAPE-WRAPPED JOINT IS BUILT UP BY THIS MACHINE, WHICH IS SMALL ENOUGH TO OPERATE IN A STANDARD MANHOLE

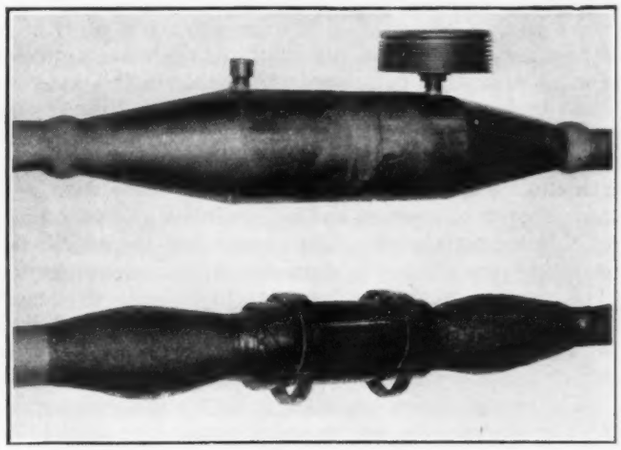


FIG. 6—BEFORE AND AFTER PLACING THE OUTER BRASS SLEEVE, SHOWING THE CANDLE WICKING TO LOWER STRESSES NEXT THE LEAD SHEATH

intimate contact between this candle wicking and the metal surfaces the lead of the cable armor is slightly belled with a tool devised for that purpose and the candle wicking forced under it. The manner in which the lead sheath is belled is shown in the sample at right in Fig. 1.

The filling compound used in this joint is thinned petrolatum. This is poured into the joint at a temperature of 250 deg. F. and allowed to run through and out a second opening at the top of the sleeve until all traces of air and moisture have disappeared. One of the filling openings is then closed with a cap, and compound under pressure is applied to the other opening for a period of approximately eighteen hours. After this period a diaphragm reservoir (Fig. 6) made of soft brass and filled with hot compound is substituted for the pressure cylinder. The corrugations of this reservoir permit expansion and contraction sufficient to care for the changes in volume of the compound in the joint as it passes through temperature cycles in operation. The complete details of the joint are found in Fig. 7.

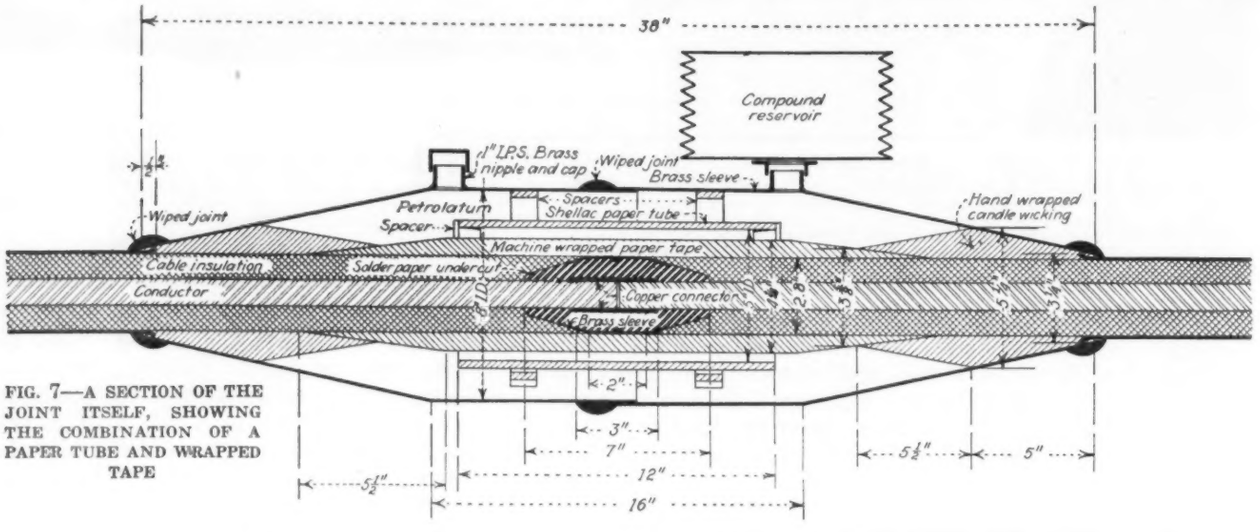


FIG. 7—A SECTION OF THE JOINT ITSELF, SHOWING THE COMBINATION OF A PAPER TUBE AND WRAPPED TAPE

JOINT DEVELOPMENT HISTORY

The development work which the Cleveland Electric Illuminating Company engineers have done on this 66-kv. joint has taken considerable time. The earlier experiments were somewhat delayed owing to the fact that no cable was available for test purposes. Development was in progress on similar cable for 44-kv. construction, although no installation had been completed and no operating data were obtainable in this country. But during 1922 the Cleveland Electric Illuminating Company placed orders for 300,000 ft. of single-conductor lead-covered cable for use in three-phase, 66-kv. circuits. The first series of joints was made with ordinary copper connectors and no insulation except a filling of thinned petrolatum. The sleeves had abruptly belled ends and were 8 in. in diameter with various lengths. The purpose of these joints was to indicate the length required to prevent longitudinal breakdown. A length of 36 in. or more was indicated by the test voltages at which breakdown occurred.

The second series was made with the same connectors and insulated with impregnated paper tape applied by the tape-winding machine. The factory cable insulation was cut in steps of uniform length and depth, the number of steps being varied from two to nine, in order to determine the most effective number. Five steps each way from the connector were indicated by the test results as being most effective.

TWO JOINTS STUDIED

Simultaneous development was then started on two fundamental types of joints—first, a joint using all insulating wrappings and no filling compound, and, second, a joint using tube insulation and filling compound but no insulating wrapping. A number of joints of each type were made up for test purposes. Those joints depending entirely upon insulating wrappings were in all cases made with five steps in the factory insulation of the cable, with diameters varying from 3 in. to 5¼ in. and lengths from 27 in. to 48 in. The insulation applied consisted in most cases of ¾-in. impregnated paper tape from 6¾ mils to 8 mils in thickness. In some cases impregnated muslin was tried, which gave some increase in longitudinal strength while decreasing the radial strength. It was found that the surfaces between the factory and the applied insulation were weak and that none of the joints of this type developed the full breakdown strength of the cable.

The joints without insulating wrappings in which the factory insulation of the cable was not stepped were then made up with tubes of oil-impregnated paper and the joints filled with hard compound. These joints also failed to develop the full strength of the cable. Both oil-impregnated paper tubes and hard compounds therefore were abandoned, and a series of joints was made using a petrolatum filling with shellac-paper or bakelite paper tubes. The initial weakness in this type of joint was in the center, owing to high stress on the end surfaces of the factory insulation. No solid insulation was applied on the connector because experience with other types of joint had shown that the junction between the applied insulation and the end surfaces of the factory insulation would be weak, even with insulating material tightly jammed against them. Tests were made on this type of joint with the space from the conductor to the surface of the factory insulation completely filled with a large metallic connector of cylindrical shape. This did not prove to be any better than a small connector. The reason for this evidently was the concentrated stress on the filling compound at the sharp edges of the large connector.

The conclusion was reached that a large connector

without sharp edges to concentrate the stress might be developed. This was accomplished by forming a conical recess in the factory insulation of the cable and filling this space with solder flush with the outside of the factory insulation. The use of this connector without other changes in the type of joint added about 50,000 volts to the test result previously obtained.

Various sizes and lengths of insulating tubes were then tried in test joints, variations being made successively on joint diameter and length. Requisite dimensions were found to be 8 in. in diameter and 42 in. in length. It was also found that the desired radial strength could not be obtained with one insulating tube, and so a design was tentatively adopted making use of two tubes, the inner one longer than the outer. This combination finally resulted in a joint which on time tests was stronger than the cable. At about this time it was determined that the joints of wrapped insulation could be made satisfactorily by increasing the diameter of the inclosing sheath to about 8 in. When this was done the diameter of the joint over the applied insulation was left at about 5¼ in. The intervening space was filled with petrolatum. Immediately joints were obtained which also withstood test voltages sufficient to break down the cable.

COMBINATION CONSIDERED BEST

At this point in the work joints of two fundamental varieties had been developed. Each was stronger than the cable itself and had certain advantages and disadvantages. It was recognized that a joint made with paper tubes depends for its success on maintenance of perfect filling. On the other hand, such a joint would show on test little or no evidence of distress until the breakdown point was approached. A joint with wrapped insulation, however, could be made with a higher instantaneous breakdown point, but there is the possibility of damage to the paper insulation at lower sustained voltages. It was therefore, decided that a combination of the two types could be made which would more nearly approach service requirements. Impregnated paper tape was substituted for the inner tube, thereby reducing the absolute necessity for perfect filling and preventing a continuous chain of moisture of foreign matter lining up between the conductor and the joint sleeve. Joints of this type properly constructed have in every case withstood time test voltages sufficiently to break down the cable.

BREAKDOWN TEST DATA, SHOWING COMPARISONS BETWEEN CABLE AND JOINT

	Cleveland Joint	Average Cable
N. E. L. A. Test to Failure:		
100 kv. for five minutes plus	260 kv.	265 kv.
10 kv. increase every thirty seconds	(One failure)	*220 kv.
Time Test:		
175 kv. for one-half hour plus	No value	220 kv.
200 kv. for four hours plus	(Cable failures)	½ to 2 hours
225 kv. to failure		
High-Frequency Test:		
50,000 cycles of damped wave oscillation, starting at peak wave value of 140 kv. with 14 kv. increase every thirty seconds to 310 kv., plus time at 250 kv. to failure	No value (Cable failures)	250 kv. 1 to 3 minutes

* After cold bending.

Later tests on this type of joint developed the fact that, although the end of the sleeve met the cable at a small angle and great care was taken in filling, high stress was developed under the sleeve at the end of the joint. Although this stress in itself was not sufficient to break down the joint, it was high enough to overstress the filling compound and sometimes damage a few layers of insulation near the ends of the joint. To prevent this damage impregnated cotton wicking was wrapped over the cable insulation at each end of the joint, as previously described. This breaks up the oil at this point into thin films, and by the higher dielectric strength introduced by the oil in films this difficulty was overcome.

The filling of the joints required in itself a long series of experiments. It was early determined that pressure must be used during the cooling of the joint to insure the filling of all voids. First, a steel cylinder with a movable weighted piston was used to obtain this pressure. This was entirely satisfactory and has been modified for use in the field. The brass diaphragm described above was the subject of considerable experimental work. When filled with compound and placed on the joint this reservoir is hermetically sealed and atmospheric pressure is relied upon for maintaining a perfect filling of compound in the joint during the load-temperature cycles. The breakdown test data are correlated in the table. The credit for this development belongs to Messrs. C. N. Rakestraw, superintendent of lines; A. R. Askue, general foreman of underground lines; E. C. Willman, chemist, and D. C. Ober of the Electrical Engineering Division of the company, and to members of their staffs who contributed valuable suggestions.

Repulsion Motors Extensively Used in Saxony

THE Saxon textile industry has adopted to a considerable extent the use of special electric motors on spinning machines, and this use is gradually increasing. For connection to three-phase power lines repulsion motors or three-phase commutator motors are used extensively. Both types are especially adapted for use in spinning mills. They are totally inclosed and well protected against dust and damage. The smooth and simple construction of the motors enables easy cleaning and attention. Cooling air is provided through underground ducts, the circulation being produced by fans inside the motor. Where air ducts are not possible, water cooling is provided for three-phase commutator motors.

The switching on, starting and regulating of the speed is arranged by only one hand lever fixed to the motor. Speed regulating is achieved by brush shifting, i.e., without ohmic losses in regulating resistance. In the spinning-technical sense the two types of control are of equal value. They differ only in their interior power factor, phase shifting, etc., and in the cost of production. Which of the two types is more adaptable in one or the other shop depends on individual requirements.

The repulsion motor which is used most extensively may be connected to single-phase, two-phase or three-phase networks operating at voltages up to 550 without intervening transformer. The number of brushes and brush holders on these motors is very small. Equal loading of the three phases of the network is achieved by distributing the motors to be erected equally upon the three phases. The three-phase commutator motor is preferred on account of its slight phase shifting and very small power consumption. Both types are constructed for regulation by hand or for automatic regulation.

Control and Checking System for Automatic Stations

Description of the Apparatus Developed for the Use of the System Dispatcher in Controlling and Checking Operations in Distant Automatic Generating Stations and Substations

By R. J. WENSLEY

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Westinghouse Electric & Manufacturing Company

ALTHOUGH the automatic equipment for central stations has been developed to a high degree of perfection, even to the extent where its performance during periods of stress seems uncanny, yet system emergencies arise which cannot be anticipated in the design of the automatic switching. There are times when the exigencies of system operation require that certain feeders be opened, although no electrical condition of the circuits indicates the fact to the automatic relays. Under these circumstances there is no substitute for the guiding intelligence of the human brain. The apparently simple and obvious method would seem to be the use of multi-conductor control cable from the operating center of the system to each station. While simple, the annual charges would exceed the cost of manual operation. Under this condition it should be manifest that good engineering practice would not permit the use of such a system for the remote supervision of stations.

In many ways the ideal means of connection is the simple telephone circuit. If it were but possible for the central intelligence to call the unattended station and transmit orders that would be fulfilled automatically the problem would be solved. However, while many wonderful means have been invented for the transmission, conversion and amplification of audible speech, there are no practical means yet available for the electro-mechanical conversion of the voice waves into actual operations.

Since the earliest method of electrical transmission of intelligence, the telegraph has been in wide use, and since there are many ways for the translation of dots and dashes into specific mechanical operations, the dot-and-dash code offers a desirable method for the automatic transmission and execution of orders emanating from the central intelligence. The most highly developed art in which dot-and-dash codes are automatically translated into mechanical operations is that of the automatic telephone. And yet the machine-switching equipment used in this art is not perfect and occasionally a wrong number is obtained. This is not such a serious inconvenience to the telephone subscriber, but should the unattended substation receive an incorrect translation of an order, there might be disastrous consequences.

SUPERVISORY CONTROL DEVELOPED

Recognizing the impossibility of perfect signaling by such means, various methods of automatically checking the accuracy of the receiving equipment have been developed. A typical equipment of the self-checking type is that recently installed by the New York & Queens Electric Light & Power Company. It is for the control of one unattended switching station from an adjacent attended station. Each of the control keys which are of the telephone type, with two large indicating lamps and one small lamp, is mounted on a plate, lamp-and-key assembly (Fig. 1) occupying a space of only 1¼ in. x 4⅜ in. One of the steel relay cabinets used with these control keys is shown in Fig. 2. A similar cabinet is used in the unattended station. The control keys are moved up to close and down to trip the circuit breakers in the distant station. Electrically locked relays respond to momentary contact of the keys so that the latter need not be held during the complete operation. An error button, similar to the one on an adding machine, permits the cancellation of any operations should the error be discovered prior to the completion of the operation. When any key is operated, the small indicating lamp is lighted and remains so until the corresponding operation is completed and checked back. The operator is thus enabled to ascertain quickly which of the switches he has elected to operate and to know when the operation is completed. Any or all of the keys may be operated simultaneously, a sequence switch compelling the sender to forward the various signals in a fixed order.

CODE OPERATES RELAYS

The code which is originated in response to the key operation consists of twenty-five impulses, twenty-two of which are dots, the remaining three being dashes. One of the latter is always the last in the code, while the distinction betwen the various codes is obtained by the location of the remaining two. The codes are originated on a twenty-five-point rotary line switch through connections established by the key relays through the sequence switch. Two electrical connections are established to two of the points on the switch. The switch is caused to pause temporarily whenever it reaches one of these points, thus creating a dash in the code.

At the receiving end a similar twenty-five-point switch is stepped around by impulses received from the above switch. To various points of this latter switch are connected selection relays. When a dash is received, time is given to a slow-acting relay to operate, thus putting the battery on the switch point and picking up the selection relay connected to that point. Connections are so made that the combination of any two of the selection relays will select some certain operation. Although this operation is selected, it is not performed until the sender pauses on its twenty-fifth point. This pause permits another slow-acting relay to put the battery on the

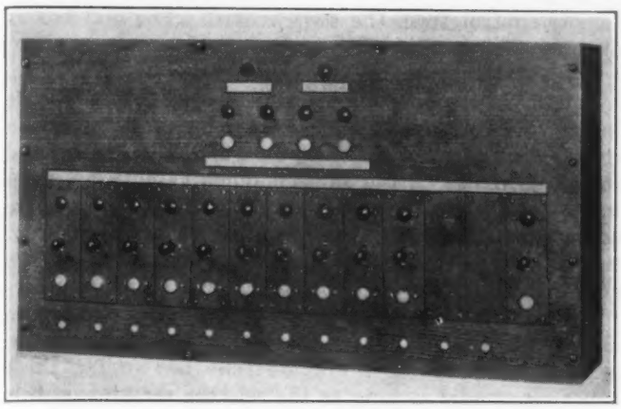


FIG. 1—DEVICE FOR AUTOMATICALLY CHECKING THE RECEIVING EQUIPMENT

twenty-fifth point of the receiver. If the receiver has reached this point, an operating circuit is established through the path previously selected and the desired operation performed.

Similar means are provided for sending signals back to the control station. The signal is initiated by the movement of auxiliary contacts on the circuit breakers or other apparatus. The mode of operation is much the same except that lamp relays are selected and operated instead of apparatus relays, as in the first case.

The sender, once started, will continue to repeat the code or codes until the correct answers have been obtained. Each key relay is connected so as to be opened by the operation of its corresponding lamp relay. Each code sent to the unattended station causes the answering code to be sent for the particular piece of apparatus involved. In this manner an endless chain is created which can be satisfied only by the correct functioning of all the apparatus involved.

Thus it may be seen that the completed signals are carefully checked to see that the full number of impulses have been received. The liability of a corrective error is so remote as to be unworthy of serious consideration.

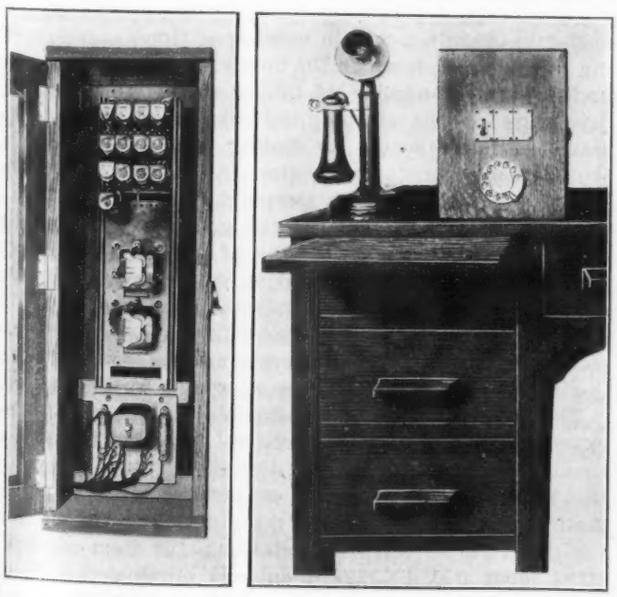


FIG. 2 (LEFT)—STEEL RELAY CABINET USED WITH AUTOMATIC CONTROL KEYS FOR CIRCUIT BREAKERS. FIG. 3 (RIGHT)—CONTROL DESK OF CLEVELAND RAILWAY COMPANY FOR USE WITH FIFTEEN AUTOMATIC SUBSTATIONS

Should the number counted be more or less than the correct total of twenty-five, no operation takes place, but the code is repeated. Therefore, if the equipment fails to function as it should, the consequences are not serious since it means only a slight delay while the code is repeated. Should the correctness of the lamp indications be questioned, a checking key is provided, in response to which the entire series of "answer-back" signals will be sent, thus verifying the positions of the apparatus at the remote station.

Some extra signal lights are provided for this particular installation to indicate abnormal conditions in the feeder voltage regulators and constant-current street-lighting equipment.

TYPICAL INSTALLATIONS

Four supervisory control equipments of this sort were recently furnished the United Railways & Electric Company of Baltimore. They include graphic ammeters at each substation with extra contacts on the pen carriage. Each contact corresponds to 500 amp. and is connected to a different code on the sender. A row of lamps on the dispatcher's desk provides the indicating means for advising him of the approximate output in amperes.

A somewhat different scheme of operation is used by the Cleveland Railway Company (Fig. 3). Space is provided on the operator's desk for controlling and indicating conditions in fifteen substations. Limitation of space precluded the use of individual keys on this desk. Instead, a keyboard resembling that of an adding machine is provided. This necessitates the use of a different method of checking. The desired code is set up by the dispatcher and a "prepare" button is pressed. The code is sent to the remote station, where it locks up the required relays but does not operate the apparatus. It does cause the return signals to actuate a lamp signal at the control point just as though the actual operation had been performed, thus enabling the dispatcher to check the remote condition brought about by the control impulses before pressing the "operate" button. The latter operation momentarily switches the indicating lamps back to their original condition; if the desired operation of apparatus is obtained, the lamps will be changed to show the actual position of the equipment supervised. Should the first answer not check with the dispatcher's intentions, a release key is operated, restoring the relays to their idle position. The code is again set up and prepared and the response again noted before the "operate" button is pressed.

CHANCES OF ERRORS REMOTE

With this equipment as with the other the chance of a corrective error is extremely remote. In addition to indicating the condition of apparatus, there are lamps to give a rough indication of transfer bus voltage, the existence of current in the alternating-current feeders and the presence of load-limiting resistance in the converter circuits. To aid in keeping track of the maintenance men in their daily rounds, a contact on the door of the station signals the dispatcher whenever the door is opened.

One of the important uses of the supervisory control equipment in Cleveland is in the obtaining of better system efficiencies by the reduction in running time of all but a few converters on the system. Since the automatic control must bring the station into service under certain predetermined conditions, and since the station must be held on the line during periods of rather light

load, in response to some predetermined minimum load, there are frequently periods at night when the station would come on and shut down again owing to the intermittent loads caused by night car service. Lockout positions are provided so that the dispatcher may take any of the stations out of service when there is not sufficient load to permit their economical operation. This naturally requires a fairly accurate knowledge of the loads in the various substations. Hence graphic instruments are installed at the central control point which function in response to impulses controlled by contacts on the watt-hour meters in the various stations. Four impulses of each polarity are sent alternately for each revolution of the meter. At the dispatcher's office these impulses are counted by a polarized armature and an escapement wheel in a manner similar to the action of the well-known cycle counter. A register driven by the escapement will give integrated results. Indications of load from moment to moment are provided by a mechanical device which compares the rate of reception of the impulses to a standard rate obtained from a clock. This ratio is the load at that moment.

All of the electrical paths between the dispatcher's office and any one substation are provided by two pairs of standard telephone wires leased from the telephone company. Elaborate tests conducted by telephone engineers failed to discern the slightest inductive interference.

A Simple Form Available

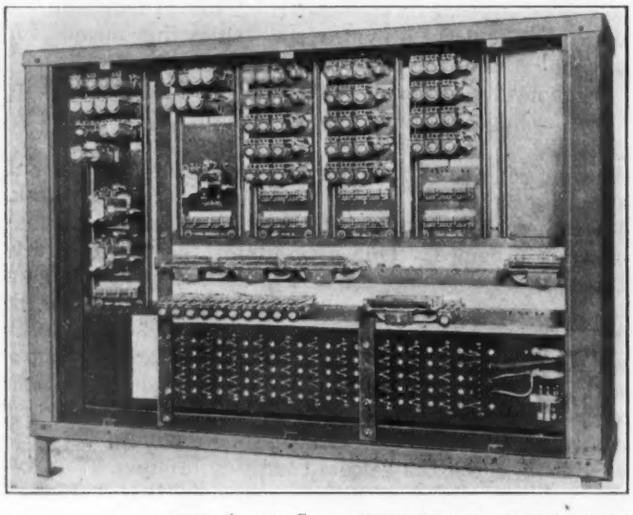
A much less elaborate and less expensive form of supervisory control is illustrated by Figs. 4 and 5. This type permits of the control of ten stations on one pair of telephone wires. The control station is exceedingly simple, consisting only of a dial, line keys and a telephone. Each receiving station consists of a cabinet containing the necessary selectors and relays and a box containing a microphone with a single-stroke bell and two or more buzzers.

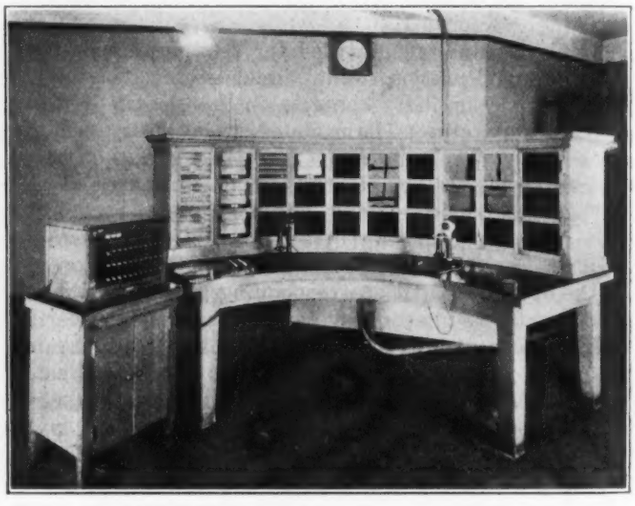
Four such equipments are employed in as many automatic hydro-electric generating stations at Connersville, Ind., by the Interstate Public Service Company. These plants are on an old barge canal which is now utilized for a power canal; the plants replace the old locks. A fifth plant is installed at the steam-power station with remote control from the switchboard. The dial box is also installed in the steam station.

One of the first things to be ascertained about a hydraulic station is the amount of water available as indicated by the height of the forebay. To ascertain this the line key is closed and the number of the desired station is dialed in the same manner as with an automatic telephone. The selectors in all four stations are advanced to the point corresponding to the number of the station desired. If this should be station No. 3, a code sender in that station will be started while relays in all the other stations lock out the stepping mechanism as long as the line relay is closed. The code sender in station No. 3 causes a single-stroke bell to tap three times repeatedly as long as the selector remains on this point. The microphone in this station enables the central operator to hear the bell and assure himself that he has the right station.

Dialing one more step, the code sender is connected to a ten-point float switch in the forebay, which causes a buzzer to operate a certain number of times corresponding to the point on which the float switch is resting. By multiplying the number of buzzer notes by a constant, depending on the station, the dispatcher obtains the actual available head. By dialing to successive points the units may be started or stopped. Another step connects the code sender to a ten-point switch connected to the waterwheel gate so that the gate opening may be ascertained. Knowing the head of water and the gate opening, a rough approximation of kilowatts may be obtained. Two differently toned buzzers are used to indicate the position of the circuit breaker. After completing any one series of operations in a given station the line key is opened, thus resetting all selectors to zero.

The availability of these flexible and relatively inexpensive means of station control is bound to have a considerable bearing on the design of future distribution systems. When used in conjunction with the automatically controlled rotating machinery and directly for the operation of switching stations, the item of operating labor may be almost entirely eliminated. Many operators erroneously include only the cost of the actual operators' wages as a saving, but it should not be forgotten that a reliable automatic device makes no errors, calls no strikes and never asks for a raise.





FIGS. 4 AND 5—A SUPERVISORY CONTROL EQUIPMENT WHICH CAN BE USED ON TEN STATIONS THROUGH THE OPERATION OF ONE PAIR OF TELEPHONE WIRES

One Thousand Miles of Street Lighting for St. Louis

City Lighting System on Zone Plan—Graded Intensities Used—Plan of Installation and Details of Equipment—Nine Million Dollars to Be Expended in Improving the Illumination of Missouri's Chief City

By ROLF TOENSFELDT
Chief Electrical Engineer Department of Public Utilities, St. Louis

IT IS fortunate indeed that the city of St. Louis made up its mind to modernize its entire street-lighting system and voted sufficient funds for doing it all at one time. It can thus avoid the inevitable waste attendant upon doing a work of this magnitude piecemeal, a little here, a little there. When studied and designed as a whole, it will not only be electrically and artistically a complete unit, but will lend itself to most economic methods of construction.

In order that this unity shall exist, the first step was the preparation of a map of the entire city, tentatively laying out streets through property which had not been subdivided. Upon this map were indicated the streets which had previously been designated by the City Plan Commission as major thoroughfares or boulevards. The City Plan Commission also prepared a zoning plan of the city, designating the use to which the various streets and areas of the city might be put. The conclusion was reached that a heavy-traffic thoroughfare would naturally be desirable for business use, and the commission established virtually all of the major thoroughfares or boulevards as commercial or secondary business streets. The usual differentiation between boulevards and secondary business streets has therefore not been made in the street-lighting program of St. Louis.

The map was then colored, street by street, to indicate what intensities of illumination were desirable in every individual section. In general, the plan divides the city into zones surrounding the heavily lighted downtown business district. A glance at Fig. 2 will more clearly indicate this. Each of the zones as it diverges from the downtown district will have a somewhat reduced intensity, so that the lighting will be gradually stepped down from the very high intensities, until beyond Grand Boulevard the lower intensities for residential streets will be attained. The residential district will be traversed by brightly lighted major thoroughfares. By adopting this scheme any sudden variations in intensities and consequent appearance of darkness will be avoided.

Having done this, it was possible to predetermine the approximate loads necessary for the illumination, and consequently to determine roughly the boundaries of the district which could economically be served from one substation. It was also possible to determine the most economical circuits to use and to rough them in.

TABLE I—ZONE INTENSITIES USED

District	Maximum	Minimum	Average
Downtown retail	2.25	0.96	1.68
Intermediate zone 1	1.60	0.64	1.20
Intermediate zone 2	0.94	0.40	0.70
Intermediate zone 3	0.63	0.26	0.47
Major streets outside of the[illegible]	0.40	0.16	0.30
Residential, heavy traffic	0.22	0.08	0.16
Residential, outlying	0.13	0.05	0.09

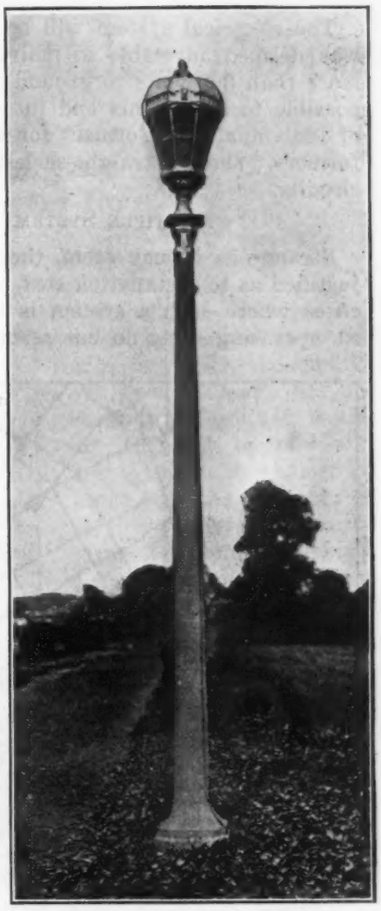


FIG. 1—TYPICAL STANDARD FOR PARK USE

The maximum, minimum and average intensities determined upon for the various zones are given in Table I.

In order to attain these intensities most economically, a comprehensive study of the available luminaires was made, and a test section of street was equipped with six of the kinds which seemed most promising. All of these, however, were rejected and the design of a new luminaire in the form of a refractor lantern was begun. By proper combination of reflector and refractor plates this lantern can be made to give symmetric, asymmetric, four-way or almost any other kind of distribution desirable. In the meantime one of the manufacturers had developed a lantern form of luminaire, with internal refractor and reflector, which, with an asortment of additional refractors, could be made to do all that our development could accomplish. The latter has the advantage that breakage will probably occur only at the outer glass, which is inexpensive but easily broken, while the former has the virtue of less absorption of light and probably much less breakage owing to the heavier though more expensive plates. It is therefore problematical which of the two devices would be the more economical in operation, though either would exceed the usual one, two or three-piece units in economy.

Another factor which will enter largely into determining the final choice will be the appearance of the units both lighted and unlighted. At the present time the manufacturer who has produced the lantern with internal refractor has not fully determined on a satisfactory glassware, so that his lantern cannot be finally judged. The refractor-plate luminaire is, however, a distinct achievement as regards both day and night appearance.

The electrical system will be somewhat unusual. It was deemed advisable to maintain a potential of not more than 300 volts to ground at the post head. It is possible to attain this end in several ways—by means of individual transformers for each lamp, group transformers, short straight-series circuits or multiple circuits.

MULTIPLE SYSTEM NOT USED

Strange as it may seem, the multiple circuit can be justified as to installation cost, and data gathered from cities where such a system is in service indicate that its operating costs do not seem excessive and that its

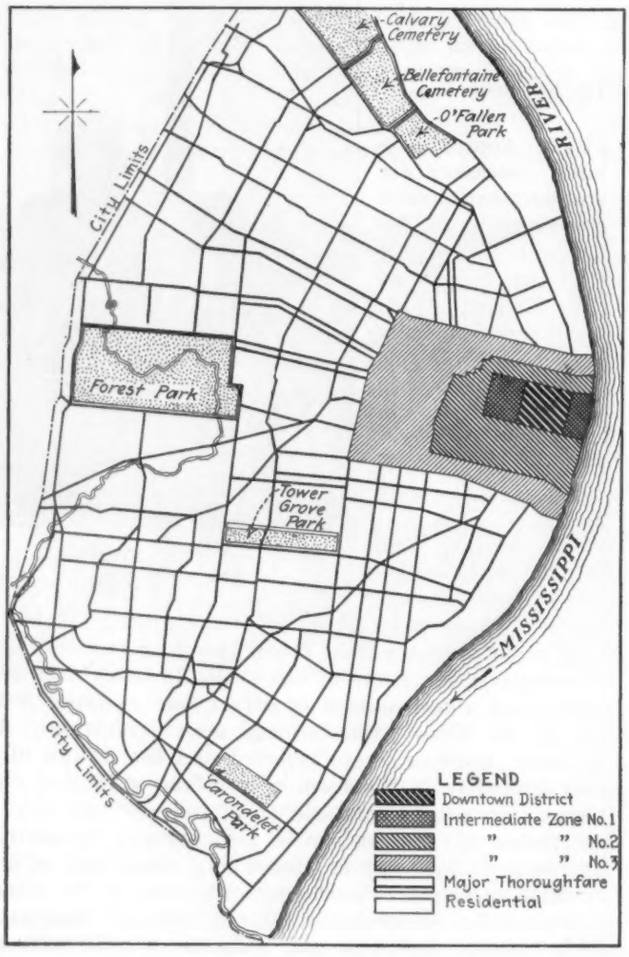


FIG. 2—INTENSITIES ARE GRADUALLY REDUCED AS ILLUSTRATED BY SHADED ZONES

reliability of service is excellent. It means, however, that the street-lighting system must be more or less tied in with the general commercial feeder system and will depend upon the feeder system for continuity of service. Where commercial feeders are all underground, and where the street-lighting system is installed and operated by the same interests that control the service company, such an installation may be desirable. A city installing, owning and operating its own street-lighting system will, however, scarcely find it advisable to tie in too closely with the service company's feeders, nor would it find it desirable to depend for continuity of service upon overhead construction, which is subject to lightning, rain, sleet and wind.

Short series circuits are out of the question where approximately a thousand miles of street are to be lighted, unless, again, they are tied in with the service company's system, as was done in Kansas City, Mo. This, too seems undesirable.

The choice between individual and group transformers rests largely with the size of lamps to be used and their spacing. The street layout also has an important bearing on the selection. It was found that for St. Louis the most economical arrangement consisted in individual transformers for the downtown high intensity district and for Zones 1 and 2. The remainder of the city will be supplied by means of group transformers. The series circuits will be grounded at the midpoint, cutting the potential of cables to ground in half, thus making possible the use of cheaper lower-voltage cable. In order that circuits under this arrangement shall not be thrown out of balance, two constant-current transformers will be used on each circuit, the transformers being connected in series and their mutual point of connection being grounded. Under all normal conditions each transformer will bear its proper share of the load with no current flow through ground. Should an "open" occur on either side, one side would continue to operate through ground.

Where the group system is used, the large number of lamps dependent upon one main circuit has led to the contemplation of a third wire, or neutral, connecting together the grounded points. This cable would be sectionalized at all transformer manholes by means of disconnecting potheads and would act as a balance wire normally, and as a quickly available spare when necessary, making it possible to get a main circuit back into service after a breakdown in a very few minutes. All lamp circuits would be so installed that no one circuit would take in both sides of any one street, so that should failure occur only one-half of the lamps on that street would be out.

AUTOMATIC SUBSTATIONS USED

The city has been tentatively divided into eleven districts. One of these will serve the downtown district and the intermediate zones, the other ten being scattered throughout the city. The substations will be located centrally in their respective districts. The downtown substation will distribute to approximately thirty circuits and will have a demand of 2,000 kva. The other substations will distribute to four circuits each and will each have a demand of about 400 kva. All substations will be operated entirely by automatic equipment.

Energy will be purchased from the service company in St. Louis at 13,200 volts and will be distributed at from 5,000 volts to ground in the downtown district to 15,000 volts to ground in the residential district. This may seem to be somewhat incongruous, yet our purpose in holding down the voltage in the downtown district and in the first zone was to allow for the inevitable expansion of the downtown district into the first zone and the necessity of following this expansion with a more intense lighting. Allowance has also been made for increased lighting in the residential part of the city, this, however, being chiefly confined to the major thoroughfares.

The mileage of streets to be lighted is approximately one thousand, the number of lamps to be installed between forty and fifty thousand, and the total connected load approximately 6,000 kva. The installation will cost about $9,000,000, $700,000 of which has so far been expended in emergency installations in the parks of the city and on some of the streets that have been reconstructed.

Service Interests Public More than Price

When of High Quality It Forms the Basis of Good Public Relations that Keeps the Public from Questioning Costs —Elements by Which Standards of Service Are Set Up

By JOHN S. ALLEN
Consulting Engineer, Madison, Wis.

IT IS sometimes to be feared that in the discussion of public relations the talk drifts too much to the education of the public and too little toward a discussion of some of the fundamentals on which good public relations are founded. Mr. Allen, who, in addition to his experience in the utility field, was the engineering member of the Wisconsin Railroad Commission for four years, brings up some of these phases which need the most careful consideration. His experience has laid emphasis on some of the things the lack of which makes for poor public relations. In the issue of the *Electrical World* for May 5, page 1034, J. Howard Matthews, service engineer of the Illinois Commerce Commission, outlined some work in grading utilities that can well be studied again after reading what Mr. Allen has to say on the setting up of standards for judging utility service.

THE public, whether it be consumer or municipal official, is not very much interested in the price which is paid for public utility service, but all are tremendously interested in the quality of service rendered by that utility. This statement is made without fear of contradiction after twenty years' experience as a builder, operator and manager of public utilities, four years as a member of the Wisconsin Railroad Commission and three years as a consulting engineer. During that time the writer has had much to do with hundreds, if not thousands, of cases of public utilities seeking increased rates or of consumers or municipalities seeking a reduction of rates, and invariably the quality of service was the determining factor in the attitude of the public.

Within the last two years a tremendous improvement has been made in the quality of service rendered by public utilities, nearly every utility having progressed in this direction to a remarkable extent. Trains are being run more nearly on schedule, there are fewer interruptions to electric service, the quality of gas is less erratic, street-railway trainmen are much more courteous and deferential, and telephone service is more prompt and less irritating.

The effect of this general improvement has been that average service has improved to an extent never before experienced. This rapid improvement and the high excellence of the present average service makes it necessary that the management of every utility should now test the quality of service being rendered by his company and make himself thoroughly familiar with what it is doing. This can be done only by comparing the quality of his service with well-known standards.

UTILITY SERVICE REQUIRES STANDARDS

The quality of service rendered by public utilities requires standards by which it may be measured just as much as standards are required by which distance, weight, time and light may be measured. These standards are not difficult to establish since their application is comparatively simple, and methods have been devised by which the personal equation of the individual making the examination is very largely eliminated. The judgment of the manager of a public utility, when unassisted by standards of comparison, is not sufficient in determining the quality of service which he is selling.

The application of standards by which the quality of service may be accurately determined is the only method by which a manager can be enabled to judge of the quality of service which he is furnishing. A drop in gas pressure at a customer's burner is reflected by the proper application of reasonable standards of service for gas companies. It is not sufficient that the manager should have complete records of the operation of his property. It is essential that he should apply standards to these records so that he may accurately determine the quality of service which he is producing.

The elements of service in an electric property by which its quality is measured consist of such fundamentals as outages, voltage regulation, meter testing and courtesy in the office. The seriousness of outages is determined by their length, the time of day at which they occur and the proportion of the system which they affect. An outage during the latter half of the night is not so serious as one that occurs between 6 p.m. and 10 p.m. On the other hand, an outage during the daytime in a manufacturing city is of much greater importance than one that occurs between 6 p.m. and 10 p.m. An outage of two minutes in a milk condensery or a foundry may cost the customer thousands of dollars. An electric service outage of fifteen minutes in a city of forty thousand persons was recently caused by a defective pilot light on the switchboard. This slight negligence had a disastrous effect upon the quality of service rendered by the utility. The standards of excellence must, of course, be applied in such a way as to reflect accurately the losses to the customer and the mental irritation caused.

Good voltage regulation is particularly necessary. Lack of regulation is aggravating to lighting customers and is disastrous to good power service. The range of allowable variation should be somewhat greater for power customers than for lighting customers, but this range should also be sufficiently flexible to reflect the greater importance of good regulation at times of peak loads. All electric meters should be tested at regular intervals, and a failure to do this should be reflected in the quality of service rendered by the company. Transformer loading is of great importance and requires much study on the part of the distribution department to see that transformers do not run long periods on light loads or that they are not overloaded.

One of the most common failures on the part of a

public utility organization is its inability to realize the important position which it holds in its community.

In a long experience covering every phase of public utility activity I have found this failure to be the most prevalent and the hardest to correct. It may be stated broadly that a public utility organization in every phase of its existence occupies a more important position than is usually realized by its members.

The personal appearance of the meter reader is of great importance. The location of the company's office, the appearance of its windows and of its sign are matters of comment. The appearance of its repair wagon and of its automobiles means much. The slightest inadvertence on the part of the manager of the company is the subject for prolonged discussion. A patron who calls on the manager will frequently for days think about and recite to others the incidents that take place and observations made in the office during a fifteen-minute interview. Whether the manager stood up or sat down is in his mind a matter worth mention. The little things which to the manager appear to be nothing may be of considerable importance to the person who comes to his office occasionally.

LITTLE THINGS COUNT

The same thing is true of the entire organization, but to a somewhat less extent. The casual remarks of a cashier to a woman customer while receipting a bill are often recited many times. To the cashier his remarks are idle pleasantries, a part of the day's work. To the patron they are matters of importance. This phase of human nature and the position held by the public utility companies make it of the greatest possible importance that the service rendered should be carefully scrutinized and its excellence or shortcomings accurately determined.

A telephone operator with the fine instincts of a lady in a gas or electric company office is of such importance that her value cannot be overestimated. Never was there another place in the world where it could be so truly said that "A soft answer turneth away wrath." A smile which comes over the telephone is enhanced in value a hundredfold. The telephone has a peculiar power of magnifying a smile to many times its usual worth. A smile, with the mental attitude which produces it and an engaging voice to accompany it, as the interpreter of a public utility, is invaluable.

A well-known manager of a large public utility recently said in the presence of other managers: "The quality of service rendered by my company has now been brought to such a grade of excellence that it is virtually perfect. We receive almost no complaints, our public relations are excellent, and our relations with the governing commission, our city councils and other civic bodies are very satisfactory."

As a matter of fact, the service rendered by his company, if tested by the usual standards, would have been found to be very poor. His relations with the public were not good and his relations with the commission and governing bodies were not what they should have been. All these facts were known by each of his listeners, but he himself was in ignorance because he had no standards by which to judge the quality of service which he was producing. If he had used established standards by which he might test his outages, voltage variations, gas pressure and public relations he would have known that he had no right to say the service furnished by his company was good.

Examinations to determine the quality of service being rendered by a public utility should be made by engineers other than those in the regular employ of the company. The regular employee is unable to obtain the point of view which comes readily to an outsider who visits the property occasionally. A large part of the benefit to be obtained by service examinations comes from the fact that the engineer doing the work is an outsider and unfamiliar with the daily routine of the operation of the property. He does not know the causes which may have brought about certain failures. A regular employee is at a disadvantage in his endeavor to appreciate improvements in the quality of service which may have been made since the last inspection.

The service engineer who comes to the property once a month or once in three months has, then, a decided advantage over the regular employee. He has clearly in mind the conditions as he found them during the last inspection, and any changes either for better or worse strike him forcibly. His record of previous inspections is before him, and comparative conditions guide him in reaching his conclusions. To have an outsider who has had a broad experience in the business come into the office and go through the plant is of great value to any utility. Many times one of the most important suggestions that can be made is that the windows of the office be washed or that the sign in front of the office be kept fresh and clean. On a recent inspection it was suggested that the arrangement of the office could be changed with great advantage both in convenience and in appearance. On the next inspection it was found that the changes had been made and the effect was very advantageous. The manager was not at all enthusiastic when the suggestions were made, but after the work had been done he realized fully the benefits of the change. This manager is very keen, alert and anxious that his property should be well operated. His position in his own office made it impossible for him to see many things which were screaming at the inspector.

Commending good performance is a large part of the duty of a service engineer. The excellent points of his service are just as obscure to the manager as are its shortcomings. I have not infrequently called the attention of a manager and of his organization to points of marked excellence in their service and found that they did not realize that their service possessed distinct points of superiority.

EMPLOYEES SHOULD BE CONSULTED

It is very important that all of the employees of a company should be carefully instructed and frequently consulted on the quality of service rendered by the company. Each employee has a very important part to perform, and if the manager makes an effort to do so, he will find it easy to interest his entire organization and keep them all at their best. A public utility cannot render the best service of which it is capable unless its entire organization is thoroughly posted on these fundamentals: (1) What good service is; (2) what the standards are by which the quality of service is measured, and (3) an accurate interpretation of these standards.

Every public utility faces the prospect of having to contest a rate case before some governing body. It is either looking forward to the time when it may ask for an increase in rates or it should be preparing for an investigation when a request is made for a reduction in rates. Its rate level is a subject which may bring on a controversy at any time. As long as the present

method of governing public utilities obtains this will, no doubt, be true. Every rate controversy presents an admirable opportunity for complainants to recite their grievances when the quality of service is not good. On the other hand, when the quality of service is of high excellence, these rate controversies are of inestimable value to the company as opportunities to receive due credit. It would appear that, however far apart rate controversies may be, customers do not fail to remember the instances when the service rendered was unsatisfactory. Frequently persons are heard to complain about instances of poor service which occurred several years before. On the other hand, as a rule, they do not fail to express their appreciation of good service.

Advertising by every method at his command the quality of service which he is rendering should be the constant aim of the manager of every public utility. The greatest asset of any public utility is good service. Cultivating good public relations means that he must look to his service. Rates are of secondary importance. The public is ready to pay any reasonable rate provided that it receives good service.

Letters from Our Readers

A Place Set Apart for Suggestions, Comments and Criticisms, to Which All Men of the Electrical Industry Are Cordially Invited to Contribute

The Seven-Day Week Is Strongly Condemned

To the Editors of the ELECTRICAL WORLD:

In the very interesting letter from "An Experienced Engineer" that appears in the ELECTRICAL WORLD for Oct. 27 the statement is made that there are a "multitude of operators who simply thrive on power-plant operation seven days a week."

While the effects of seven-day employment are sometimes not apparent, they are nevertheless very real and always harmful, as is evidenced by the physical appearance and the mental attitude of men who have been engaged in power-plant work for a period of several years. The seven-day working week has no more right to existence in the central-station industry than has its original companion, the twelve-hour shift, and it is a fact that many men cannot work seven days a week and keep "their minds alert and clear to grasp new ideals and situations."

All employees engaged in power-plant operation should be required to cultivate a mental attitude that is intelligent and constantly alert, in order to be prepared to cope with any operating difficulty or emergency that may instantly arise. But such employees cannot be expected to remain mentally alert if subjected to the constant strain of a seven-day working week or of twelve-hour shifts.

It is quite possible that a forty-eight-hour working week is not economically justified in many small plants, and if such is the case, the answer seems to be to make them entirely automatic. But a station in which an apprentice engineer can profitably spend any amount of time is usually too large to be made absolutely automatic in its operation, and when it is of this size sufficient men should certainly be employed to put an eight-hour, six-day week into effect.

The greater efficiency that can properly be demanded from an operating force working eight hours six days per week will usually compensate for the increased labor charges, but, if not, the public will generally not object to the slight increase in rates necessary to enable the utility to put a forty-eight-hour working week, or its equivalent, into effect.

It is true that a man employed in an executive or managerial position will at times be well-nigh overwhelmed with perplexing problems, and it is equally true that more than forty-eight hours per week will be required to enable him to dispose of these and to formulate plans and policies. But it must be remembered that the executive does not solve his problems in a dirty, dark boiler room, in a noisy generating room, or even on a cold thrust deck; and his employment is more interesting, inspiring and broadening in its effect than that of watching stokers, regulating voltage, synchronizing, maintaining frequency, blowing out generator windings, sweeping, wiping and polishing brass. Neither is he required to alter his working hours every week or two, as is the operating attendant.

I am very glad that the "Young Engineer" has come forward with a justified criticism of a condition that is a reproach to the central-station industry. That industry is to-day great enough and of sufficient importance to offer ideal working conditions to every operating man, whether he be a wiper or a station superintendent. And I believe that no utility should utter one word advocating good public relations until all of its employees work under good conditions at fair wages. A seven-day working week cannot, under normal conditions, be considered as a desirable condition of employment in any central station.

Further, those executives of broad vision and high ideals who have, of their own accord, abolished the twelve-hour watch, along with the seven-day working week, are to be congratulated. Those other executives who are waiting until forceful action on the part of a labor organization, or hostile public opinion, requires them to improve working conditions are, so it seems to me, not serving the central-station industry in a manner that is really best for all concerned.

AN EXPERIENCED OPERATOR.

Illumination of Generating Stations and Substations

To the Editors of the ELECTRICAL WORLD:

E. D. Tillson's article on substation illumination, which appeared in the Oct. 27 issue of the ELECTRICAL WORLD, is timely and brings up a matter that should receive a great deal more attention from station designers and operators than it apparently does.

With the advent of the tungsten lamp central-station executives began to preach better illumination in earnest, yet within this period a good many generating stations and substations have been placed in operation in which the lighting, to say the least, is poor and unsatisfactory. In addition, there are many stations in which the degree of illumination is today about the same as when installed twenty years or more ago, little attempt having been made in the interim to practice in the way of lighting what has been preached to the public.

A survey of lighting intensities found on central-station properties would doubtless prove of interest and disclose a peculiar condition existing within this industry. It appears that lighting systems are even today laid out along the rule-of-thumb lines possibly considered good practice thirty years ago, before actual intensities could be so easily determined as is now possible.

FIAT LUX.

Central Station and Industrial Practice

Installation, Operation, Maintenance, Test and Repair of Generation and Distribution Equipment, and Methods of Economically Utilizing Electric Service in Large Industrial Plants

Successful Operation of Turbo-Generator as a Synchronous Condenser

By N. D. Holmes

Chief Engineer Farmingdale Station, Central Maine Power Company, Gardiner, Me.

FREQUENTLY it is necessary for an electric power company operating both steam and hydraulic generating plants to run one or more steam units at light load and low power factor in order to maintain normal voltage during periods of ample water supply or else to install synchronous condensers for use during the high-water period. Until recently the New England Power Company has operated a turbo-generator at not less than 10 per cent full load, this being as light an output as is considered advisable to carry, and this demanded a considerable amount of fuel chargeable to voltage regulation as the power output of the unit was not needed. To obtain better economy it was decided to try to operate a 12,500-kw. Curtis turbo-generator as a synchronous condenser, using the exhaust steam from the station auxiliaries for circulation through the turbine to prevent the rotor overheating. The unit is a nine-stage machine running 1,800 revolutions per minute and driving an 11,000-volt generator and directly connected exciter.

Arrangement of Equipment

A 3½-in. hole was drilled in the high-pressure head. This was connected with the main exhaust steam line by a 4-in. steam pipe fitted with a 4-in. gate valve near the turbine. Opening this valve allowed steam to flow from the main exhaust line into the first-stage exhaust chamber of the turbine, provided that the chamber pressure was less than that in the exhaust line. A 1½-in. live steam connection was also made into the 4-in. line for supplementary use.

To determine whether the exhaust steam from the steam-driven auxiliaries was sufficient to prevent the turbine rotor overheating, to find out whether the unit would be overspeeded by this quantity of steam should the generator oil switch be opened, and to learn what effect the vacuum in the condenser had upon the turbine temperature, a test was made. Thermometer wells were placed in the first-stage exhaust chamber, the fourth and sixth-stage diaphragms and on the exhaust side of the blading near the ninth-stage wheel, all the wells being as near the wheel blading as possible and the thermometers installed to permit easy reading with the machine in operation. All auxiliaries in this plant are steam-driven, exhausting into a common header leading to an open heater and also through a relief valve into the atmosphere. During the test the relief valve was set to open at 1½-lb. gage, and the valve leading to the heater was adjusted to admit only enough steam to heat the feed water, the remaining steam being forced into the turbine.

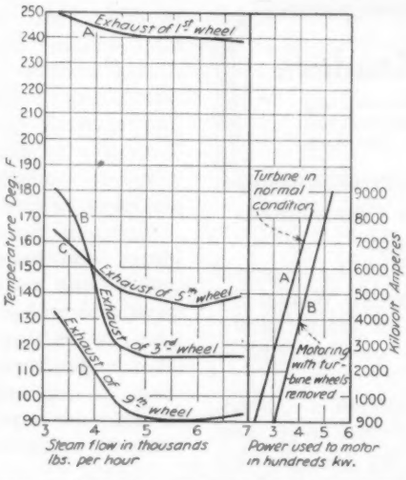


FIG. 1 (LEFT) — TURBINE TEMPERATURE VARIATIONS WITH STEAM INPUT. FIG. 2 (RIGHT)—INPUT OF TURBO-GENERATOR AS A SYNCHRONOUS MOTOR

On test the unit was started up and put on the line in the usual way, a light load being carried until the usual running temperatures were reached. The load was then dropped and the valve admitting the exhaust steam was opened wide; the 1½-in. valve controlling the live steam was opened, and the turbine throttle valve closed tight, the unit being, of course, motored at full speed by the power system to which it was connected. Frequent readings showed the temperature to be dropping all through the turbine, so the valve admitting the live steam was closed. This connection was later removed as it was found to be unnecessary.

The test was continued, using various quantities of the exhaust steam and noting the effect on the temperature.

The results of this test run are shown in Fig. 1. The fact that a higher temperature is shown in the sixth stage than in the fourth is due to the influence of the excess shaft-packing sealing steam, which is admitted to the turbine near this point. It appears that the exhaust steam from the turbine-driven auxiliaries contains considerable superheat, as shown by temperature curve A (Fig. 1), and that with less than 4,500 lb. of steam per hour the rotor heats very rapidly. The test was run with a 29-in. vacuum. With the exhaust-steam valve wide open, the rotor started heating very rapidly when the vacuum was lowered to 26½ in.

The test for overspeeding was made by opening the generator oil switch with the exhaust-steam valve wide open. The unit slowed down to 1,350 r.p.m. and held there, which proved that while the exhaust steam alone would not overspeed the unit, throttle leakage, etc., would have to be guarded against.

These tests were run in 1921, and the unit has since been operated during high-water periods in practically the same manner as on the test. Under normal conditions the unit is run from 6.45 a.m. to 5.30 p.m. It is started in the usual way and a light load carried for about twenty minutes; then the load is dropped and the exhaust-steam valve

opened wide. The unit is available for load at any time, and it is often changed from motoring to generating on very short notice. The kva. carried varies with the voltage conditions, but a normal load is 8,000 kva. To shut down the field is adjusted until unity power factor is obtained and then the generator oil switch is opened.

Fig. 2, curve A, shows the kilowatt input of the unit when motoring with various kva. loads.

In December, 1921, while generating, this turbine threw some blades from the seventh-stage wheel, and the result of the subsequent inspections was a decision to return the entire rotor to the factory for overhauling and to install a more modern type of shaft packing. In order not to cease operating the unit as a synchronous condenser during the time that the rotor was at the factory, use was made of a duplicate shaft, without wheels, which was procured from the manufacturers.

The turbine rotor was removed and the shaft without wheels installed in its place, connected with the oil pump, etc. The cover was replaced, and the unit is now being operated as a synchronous condenser without, of course, any steam at all being used. A new rotor has recently been installed.

The unit is started by tying the leads from the generator with those of a 5,000-kw. unit in the same plant, through an air-break switch. The 5,000-kw. unit is started in the usual way, warmed up and then stopped. The air-break switch is then closed; field current is applied to both generators, and steam admitted to the 5,000-kw. turbine, which starts both machines with a very small flow of armature current. After the machines are synchronized with the system the air-break switch is opened and the 5,000-kw. unit is shut down.

Curve B, Fig. 2, shows the kilowatt input required to motor the 12,500-kw. unit at various kva. loadings, since the bare shaft was substituted for the turbine rotor.

Demand-Meter Attachments to Prevent Errors

By R. L. Weber
Electrical Engineer Kansas City Railways, Kansas City, Mo.

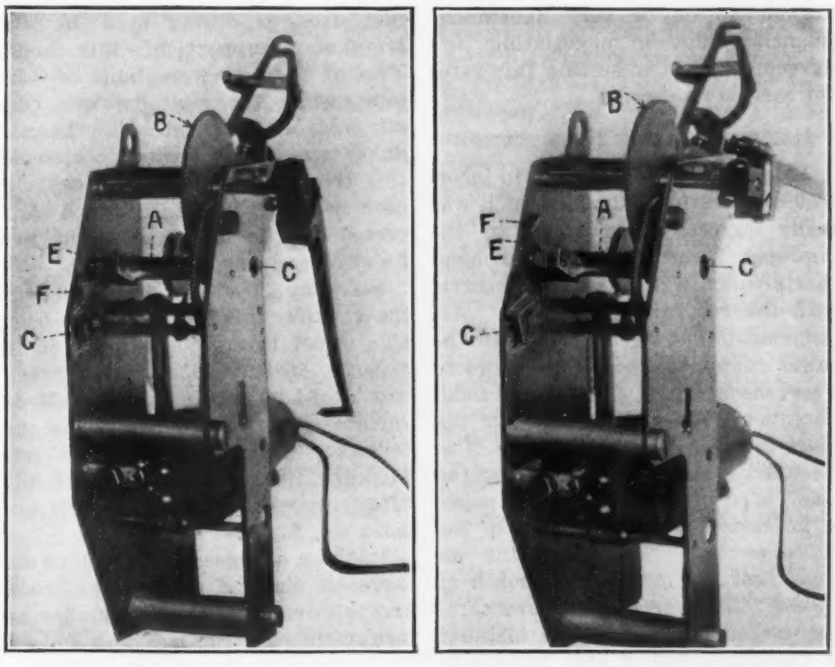
BY PROVIDING a stop on an intermediate shaft of a demand meter, insuring an accurate zero starting of the stylus, the Kansas City Railways has rectified a hidden defect in one of its large consumers' meters which caused an annual loss of $450. Had the demand charge been determined upon the registration, during a single half-hour period instead of the average of three, the annual loss would have been $1,350. This demand meter has a seven-day chart with thirty-minute registrations, the stylus being actuated by a ratchet mechanism energized by a contact device attached to the watt-hour meter.

Owing to the character of the customer's load, it was anticipated that his largest demand would occur just preceding Christmas. Therefore a special observer was sent to check the operation of the demand meter and also to compare it with the power company's and customer's watt-hour meters installed at this point. The observer recorded the time in seconds between the operations of the contact device in the watt-hour meter, each movement of which represented a definite number of kilowatt-hours, and also at intervals recorded the watt-hour meter-dial readings.

For moderate loads the operation of the stylus was regular in every way. But after the stylus had returned to zero following the registration of a high demand it was noted that there was no apparent movement of the stylus for several ratcheting operations, the registration being sometimes as much as five steps low. The irregularities occurred only on cycles following heavy demand registrations, which was of special importance because that was just the time when especial accuracy was desired. The accompanying photographs show the attachment made to the meter to insure an accurate zero starting of the stylus. They are explained below.

In Fig. 1, which shows the stylus in the zero position, gear *B* on the stylus shaft is driven by a small pinion on the shaft *A*. There is a stop on the gear *B*, but when the stylus drops following a large registration the speed of return is so high that the inertia of the parts mounted on the shaft *A* is sufficient to carry them beyond the true zero; so that the slack in the mechanism, which is exaggerated by the small pinion, is taken up in the wrong direction. In other words, the backlash in the mechanism displaces the zero, so that observation through the hole *C* shows that the large gear on the shaft *A* overtravels one-half the diameter of the hole *C*. The meter was less than a year old when this error was discovered.

In remedying this defect three rectangular blocks of brass were made and installed by our meterman. Block *G* is a rigid stop sweated onto the side plate. Block *F* is loose upon the shaft *A*, while block *E* is securely soldered to shaft *A* and has a pin set at such a radius as to clear the inside of block *G*. Shaft *A* revolves more than 360 deg., so that a simple mechanical stop cannot be installed on this shaft, thus requiring the addition of block *F*. The



ATTACHMENT INSURES ACCURATE STARTING OF STYLUS FROM ZERO POSITION

Fig. 1—The position of the attachments when the meter stylus is in the zero position. Fig. 2—On resetting after high demands the pin in block *E*, which is below block *F*, revolves, coming to a stop on the upper side of block *F*, as shown in Fig. 1, thus insuring accurate starting of stylus on the next cycle of operation by preventing lost motion between shaft *A* and the stylus of the meter.

functioning of this stop is shown in Fig. 2.

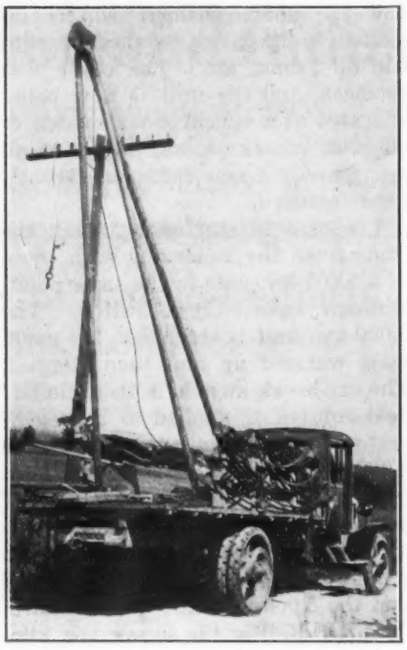
Again referring to Fig. 1, which shows the stylus in the zero position, it will be noted that the pin in block *E* rests upon the upper side of block *F*, the stylus arm pointing downward. In Fig. 2 the pin in block *E* is on the underside of block *F* since block *E* has revolved about 360 deg. while the stylus arm has risen to approximately the horizontal position, indicating a high demand. When the mechanism resets and the stylus arm drops rapidly from the horizontal to the zero position, block *E* revolves counter-clockwise, coming to rest when the pin strikes the upper surface of block *F*, which has already been stopped by the rigid block *G*. It is possible for block *F* to be carried over the vertical dead center, but this has been found to be of no effect since block *E* will carry it around with it satisfactorily. By this additional zero stop no lost motion needs to be absorbed before the meter will start registering.

A pawl spring in the center of the device was increased slightly in tension by cutting off a small section. This was done by the meterman on his own initiative, and it is not certain that this would be required under all circumstances. The meter now functions equally well under all conditions, and while these new parts have been in service for only a few months, the attachments seem substantial and free from unusual strain.

Regarding demand measurements, our experience has been such as to lead us to continue them throughout the year; that is, to cover off-peak as well as on-peak periods. Some of our older contracts were drawn so that the demand during the off-peak periods had no effect upon the payments, but quite frequently we have found the records for the off-peak periods to be of very substantial financial value in negotiating new agreements and in setting fair rates for service rendered.

INCORRECT METER REGISTRATION

An early trouble resulting in incorrect registration, but one which was easily corrected, was caused by the improper insertion of the demand charts which were installed eccentric with the recording movement. Arrangements had been made with the power customer for his operators to insert these charts. Despite the small clearance between the hole in the chart and the boss over which it is supposed to fit, it is possible for the inner edge of the hole in the paper to be curled at right angles to the plane of the chart, producing an eccentricity of nearly a sixteenth of an inch. This, of course shows carelessness on the part of the installer of the chart, but it also represents a money loss to the power company. By instructing the men to exercise care when replacing the charts these losses were eliminated.



THIRTY POLES A DAY ERECTED WITH THIS 26-FT. GIN POLE

Setting Poles at a Cost of $4.48 Apiece

BY J. K. HIMES
Superintendent Distribution Dayton (Ohio) Power & Light Company

IN ORDER to rush through the installation of the two 66,000-volt circuits from Dayton to Cincinnati, the Dayton Power & Light Company mounted the gin pole illustrated herewith on a 3½-ton truck at a total expense of $156.10. Regular galvanized-iron pipe was used for the triangular support of this hoist. Two of the legs were built of 3-in. pipe, while the rear leg was constructed of 4-in. material. Then a pulley was fastened at the apex of this triangle. A ⅝-in. steel cable is used with a 10,000-lb. winch connected directly to the motor by two forward and one reverse gear.

Standing 26 ft. from the bed of the chassis, this gin pole has been able to set thirty poles a day at an expense of $108.46, or an average cost of $4.48 a pole. The costs of various days' operations were as follows: Twenty-three poles set, $105.67; thirty poles set, $108.46; fifteen poles set, $90.10; twenty-six poles set, $117.37.

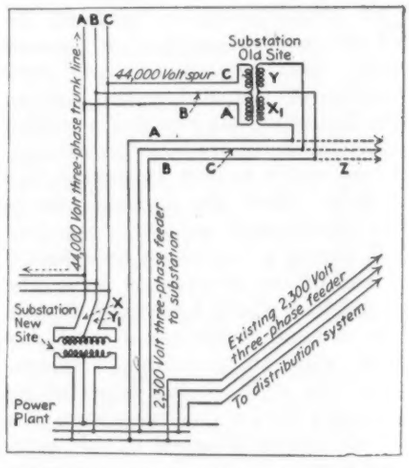
In these expenses are included all the costs charged against the truck and the driver, the total number of men in the construction gang and all the necessary tamping. Although 50-ft. poles were installed in this line, this construction crew set eighty-eight 40-ft. poles on a highway which had no telephone wires to interfere with the raising. The nicety of control of this gin pole may be seen from the fact that a 65-ft. pole was set in a tobacco patch without damaging any tobacco.

Substation Moved Without Interrupting Service

BY A. P. BROADHEAD
Superintendent of Power New York State Gas & Electric Corporation, Oneonta, N. Y.

RECENTLY a 44,000-volt substation of the New York State Gas & Electric Corporation was moved a distance of two miles without interrupting or curtailing service. The original location of the substation was about two miles from a small hydro-electric plant that served the local system. Owing to low water conditions this station was unable to supply all of the 2,300-volt load.

The substation contained two 500-kva., 44,000/2,300-volt transformers connected in open delta, and there was an extra 500-kva transformer in stock. The new substation was erected about 75 ft. from the power plant and the spare transformer *X* was connected in parallel with transformer X_1, after which X_1 was cut out of service and taken to the new site and installed at Y_1 without interrupting service. Transformer *Y* was then cut out and held as a spare.



MOVING A SUBSTATION TWO MILES BY USING ONE SPARE TRANSFORMER

The change was made more difficult because of the fact that on the original installation the phases were crossed, and this arrangement had to be carried through to the new site until such time as the phases can be brought out symmetrically. The 2,300-volt, three-phase feeder which fed the old substation was utilized as a feeder from the power plant to the local distribution system and is shown on the illustration at *Z*.

Omitting Generator Bus Effects Saving

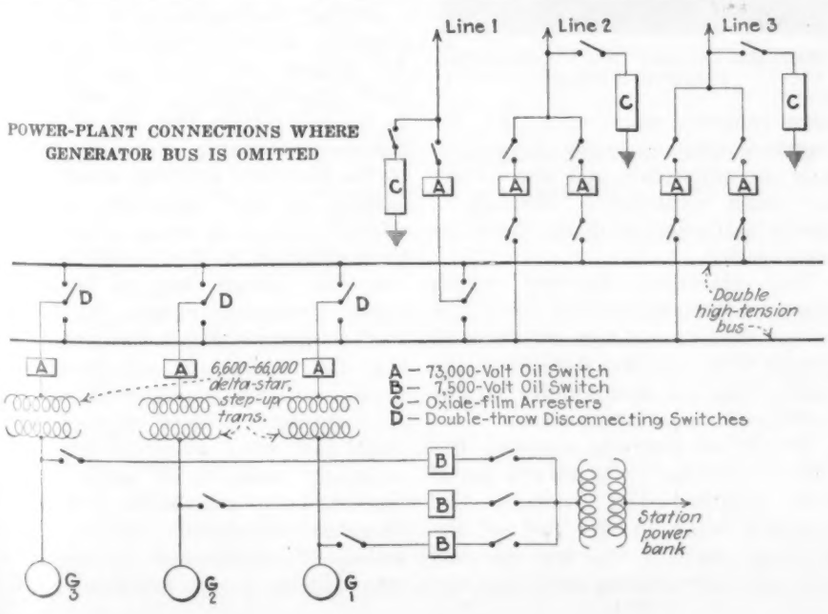
BY R. W. SHOEMAKER
Superintendent Electrical Department, Turlock Irrigation District, Turlock, Cal.

THE present tendency in hydro-electric power-plant design seems to be toward the elimination of the customary low-tension or generator bus, low-tension oil switches, etc. In the Don Pedro power house of the Modesto-Turlock Irrigation District the leads from the three 4,000-kw., 6,600-volt generators are connected direct to the delta-star 66,000-volt step-up transformers. As will be noted from the accompanying diagram, the usual low-tension bus, oil switches and disconnecting switches have been omitted. Each generator and its transformer therefore operate as a unit. The high-tension leads of each transformer are connected to a double high-tension bus through a 73-kv. oil circuit breaker and a set of double-throw disconnecting switches. The outgoing 66,000-volt lines are connected with the high-tension bus through 73-kv. oil circuit breakers and each line is provided with oxide-film lightning arresters. Two of the lines are connected to the bus through two oil circuit breakers by means of which the buses may be paralleled or a line transferred from one bus to the other without interrupting the service.

Two sets of synchronizing buses are provided on the switchboard. One of these is energized from potential transformers on the generator leads and the other from potential transformers on the high-tension lines. Each generator has a direct-connected exciter which is provided with an individual Tirrill regulator. Any one exciter can handle one generator besides its own, but the exciters cannot be paralleled. Any one of the generators may be connected through a 7,500-volt oil circuit breaker to the station power-transformer bank, but these switches are interlocked so that only one switch may be closed at a time, making it impossible to parallel.

No figures have been prepared to show the saving in expense resulting from the type of construction employed, but it is safe to say that at least $75,000 was saved by the omission of the generator bus, low-tension oil circuit breakers, disconnecting switches, etc., in this particular station. The writer is not, however, in entire sympathy with the use of double-throw disconnecting switches between the high-tension transformer leads and the two high-tension buses, as shown at *D* in the accompanying diagram. It would have been preferable to make this connection with two oil switches in the same manner as lines 1 and 2 are connected to the double high-tension bus.

It was proposed at one time to construct the plant with lines 2 and 3 on double-throw disconnecting switches and one switch in a manner similar to line 1, but this would have prevented transferring the load from one bus to the other in case of trouble without an interruption to the service. For this reason additional oil switches were provided, as indicated on the wiring diagram. Actual operation of the plant as constructed shows that this change has increased very greatly the flexibility of the plant operation over what it would have been had the extra oil switches not been installed.

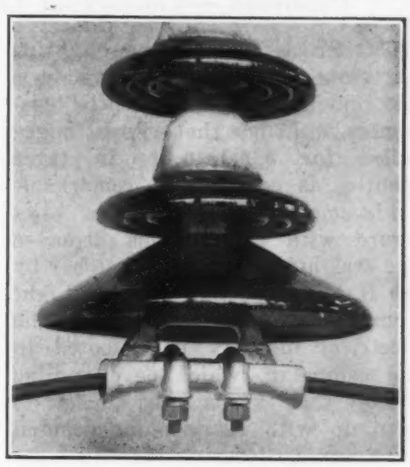


POWER-PLANT CONNECTIONS WHERE GENERATOR BUS IS OMITTED

The generators and transformers are protected independently by time-limit relays of the induction type connected differentially.

New Corona Shield for 165,000-Volt Line

IN DESIGNING the 100-mile, 165,000-volt transmission line for the city of Seattle's Skagit River project the electrical engineer, in co-operation with the engineers of the insulator manufacturer, worked out a simple, inexpensive and effective corona shield differing radically from those now in use on high-voltage lines of the Pacific Coast. The shield, which is shown in the accompanying illustration, is made from a ⅛-in. circular sheet-steel plate 15 in. in diameter. This is stamped into a saucer shape, and on the flat part or the bottom of the saucer two parallel slots are stamped out so that the shield may be dropped over the clevis of the line-conductor clamp. In this way no extra attachment or hardware of any kind is required to support the shield. After stamping the plate the edges are rolled and the shield is dipped in asphalt paint and baked.



NO EXTRA ATTACHMENT OR HARDWARE IS NECESSARY WITH THIS TYPE OF CORONA SHIELD

This type of static shield not only distributes the electrostatic stress equally along the insulator string, but serves as well as a splash plate to wet the under side of the lower insulator unit. In addition, there is sufficient metal to withstand several flashovers without impairing the effectiveness of the shield. The insulation of this line will consist of ten insulator units on suspension, twelve units on angle towers and fourteen units on dead-ends.

Central Station Business

Advertising, Selling and Service Methods
Commercial Organization and Management, Customer and Trade Relations, Public and Financial Policies, and Reports of Company Plans and Experiences

Seven Thousand 150-Watt Kitchen Lighting Units Sold in Thirty Days

Intensive Campaign Methods of Hartford Electric Light Company Surpass All Expectations—How the Work Was Organized — Commercial Lighting Campaign to Follow

TO SELL 7,000 kitchen lighting units within thirty days in a city having 36,000 residential customers, although the original bogey called for 5,000 units in three months, is certainly a remarkable achievement. This is a net sales figure with cancellations deducted and was attained during October by the Hartford (Conn.) Electric Light Company. All four branches of the electrical industry participated in the campaign, which developed so rapidly that it was most difficult to keep up with the popular demand for fixtures. Nothing like this campaign has ever been experienced in the long and striking history of the Hartford company.

Plans for the campaign were prepared last summer, and the intensive sales effort was launched on Oct. 1. The appeal to popular interest was based on a thirty-day free trial offer of a 150-watt "Daylight" kitchen unit, acceptance being followed by instalment payments of 75 cents per month until a total of $7.50 shall be reached. The whole campaign was keyed upon an effort to place kitchen illumination upon a plane comparable with high-grade office lighting; to establish a base for further improvement of home lighting by carefully selected fixtures and methods, and, it goes without saying, to increase revenue.

Preliminary Organization

In planning this campaign the Hartford company from the outset sought to insure an arrangement profitable to all the interests concerned. In August an understanding was reached with the Edward Miller Company, Meriden, Conn., for the use of that company's lighting hanger No. 593, finished in white enamel. In general, these fixtures were equipped with a Lavolier canopy switch wired complete with a 6-in. lead. The glassware selected was the Ivanhoe Trojan No. 5264x12. This material was handled from the warehouse of the Southern New England Electric Company, a local supply jobber. The J. A. Corcoran Electric Sales Service was engaged to canvass the 36,000 residence-meter lighting customers at Hartford, with an average of about forty men in the field.

STANDARD DISPLAY FOR CONTRACTOR-DEALER'S WINDOW

Arrangements were made by the Hartford company to pay these salesmen on commission and also to pay for sales supervision through a weekly settlement with the Corcoran organization.

The Hartford Electric Light Company contracted with local contractor-dealers to hang the fixtures, if possible within five days from the date of the salesman's order, at the lighting company's expense.

The Miller company supplied 40,000 "broadsides" with return postal card attached—the postage and printing being at the cost of the lighting company—as well as cuts and other advertising copy and material for the lighting company and the local contractors. The lighting company furnished the necessary order forms for salesmen, who took orders for convenience outlets in kitchens where no other place for the use of an appliance other than the present ceiling outlet existed. It was agreed that the manufacturer's selling organization should receive no commission for fixtures sold by local contractors in their own stores nor for sales made by employees of the lighting company in its own store.

Participation by Contractor-Dealers

Local contractor-dealers were invited to a dinner early in September, the occasion being utilized to inform them of the plan of campaign and to seek their co-operation. It was arranged at this time that all electrical stores in Hartford should sell the Miller fixture with Ivanhoe-Trojan glass to their customers in their stores during the campaign period at the same price as the Hartford Electric Light Company. The Southern New England company agreed to keep this fixture in stock during the campaign and afterward and quoted the local dealers minimum price regardless of quantity ordered.

During the campaign the lighting company agreed to carry all accounts for kitchen unit sales and installations by contractors. It announced to the contractors that the most extensive advertising ever undertaken by the Hartford company would be a feature of the campaign, and it offered to share in group advertising by contractors in this connection. It was also agreed that no house-to-house canvassers except the Hartford company's would be used during the campaign, as otherwise great confusion would result. Signs for contractor-dealers' window displays and other publicity material, including exhibits of units, were furnished by the Miller company. Telephone solicitation and the solicitation of commercial installations was agreed to be permissible for

contractor-dealers during the campaign.

As a new development for this campaign, the American Wiremold Company of Hartford designed an attachment for the Miller fixture to serve as a convenience outlet for the use of appliances. In this way the Miller fixture can be sold with or without a convenience outlet as the case may require. This convenience attachment consists of a run of "Wiremold" 15 in. long, extending from the Miller canopy and terminating in a ceiling rosette, from which a reinforced lamp cord is hung with a keyless socket. Where no ceiling outlet already existed "Wiremold" was also used, running from a sidewall outlet to the center of the ceiling for the new kitchen unit. The sales price of these two outlets was $1.50 and $5 respectively.

For hanging the fixtures on ceiling outlets already existing contractors received 75 cents each. The contractor received 50 cents and $1.50 for the "Wiremold" extensions. In case of cancellations the contractor agreed to take down the fixture and put up the old equipment, leaving things in a workmanlike condition, within a week from receipt of order, for $1 apiece, and returning material to the stockroom. No trials were allowed of convenience outlets, these installations being final and left connected to old fixtures.

How Advertising Started

In the week end preceding the beginning of the campaign a model kitchen, 10 ft. x 13 ft. in size and 8 ft. 9 in. high, was installed in the lobby on the first floor of the lighting company's main office building. It was provided with removable panels of beaverboard which permitted it to be closed on the show-window side during the daytime and opened into the office lobby. At night the office side of the model kitchen was paneled off and the entire display opened to window inspection. In this model kitchen an old-style illumination by a pendent 60-watt lamp was contrasted with one of the new 150-watt units. An electric range, washer, water heater and other apparatus were shown in the model kitchen. More than a thousand units were sold out of this model kitchen alone. The Ann Street show window in the Hartford company's substation (see ELECTRICAL WORLD, Oct. 27, 1923, page 871) was effectively used during the campaign to stage a display of electrical equipment for kitchen service, including the "Daylight" units. This equipment was compared with old methods under the respective designations of "Gloomlight" and "Gloomchaser."

MODEL KITCHEN SET UP IN COMPANY'S OFFICE

By removing panels this was turned into a striking window display at night.

On Sunday, Sept. 30, a full-page advertisement was run by the Hartford company in the local press, and at the same time the broadside with attached postal card was mailed to all residential customers. The newspaper advertising throughout the month was naturally concentrated upon the theme of providing daylight conditions in the kitchen, contrasting office illumination with kitchen lighting, offering the thirty days' free trial of the unit installed and emphasizing the low cost of the improved service on the 5½-cent energy rate lately established by the company in connection with its well-known two-part rate described in the ELECTRICAL WORLD for April 21, 1923, page 917.

A survey of kitchen lighting in 200 residential installations at Hartford before the campaign disclosed an average unit of about 59 watts per kitchen. The additional expense to the householder with the 150-watt unit should not exceed 50 cents per month, but the total increase in revenue per year for the Hartford company is estimated at $40,000, based on 1,000 hours' annual use. The increase in illumination is roughly from 2 ft.-candles to 6 ft.-candles total.

Hanging Crews Unable to Keep Up with Demand

Before the campaign it was hoped that it would be possible to install all fixtures within three days from receipt of order, but so great was the demand that this was not feasible. Hundreds of fixtures were awaiting installation on Nov. 1, and to assure customers that every effort would be made to serve them a postal was sent to those awaiting trial installations telling the Hartford Electric Light Company's gratification at the receipt of the trial order and promising to install the fixture as soon as its men could get to the customer's house and find him or her at home. The post card pointed out that more than a thousand customers placed their orders for these fixtures within the first week of the sale and that the fixture proved so popular that the crews hanging it were being badly strained to keep up with the sale. It was announced that the facilities were being increased for doing this

OFFICE RECORD

Date Compl._____
Contr. _____
H. E. Lt. Ord. No._____

Kitchen Unit	$0.75
Conv. Outlet A	0.25
" " B	1.50
Outlet C @ 0.50	____
Total due Contr. $	

_____
Contr.

Installation, as ordered, has been completed satisfactorily.

_____
Customer.

THE HARTFORD ELECTRIC LIGHT CO.,
266 PEARL STREET, HARTFORD, CONN.

The Hartford Electric Light Co.: *Date*_____ *1923.*

You may install on the ceiling outlet in my kitchen, for 30 days' free trial, your DAYLIGHT KITCHEN UNIT, complete with lamp. At any time within 30 days, if I notify you, you will remove it and replace the old fixture at your own expense. If I do not notify you within the 30 days' trial, I agree to pay $0.75 each month until I have paid $7.50; these payments to be paid with my light bill.

Also install CONVENIENCE OUTLET Style A @ $1.50 Style B @ $5.00 for which I agree to pay $0.75 each month until paid for, following Kitchen Unit payments.

Agt. No.____ Ord. Frm. F.P. Total Amount of Sale_____

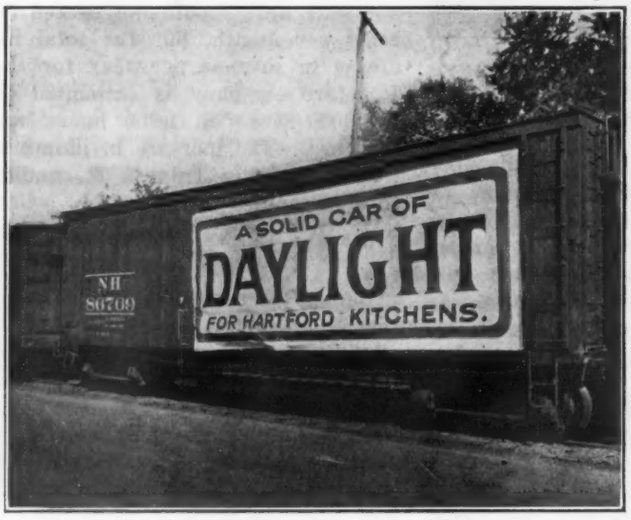
Ed. M. Co._____

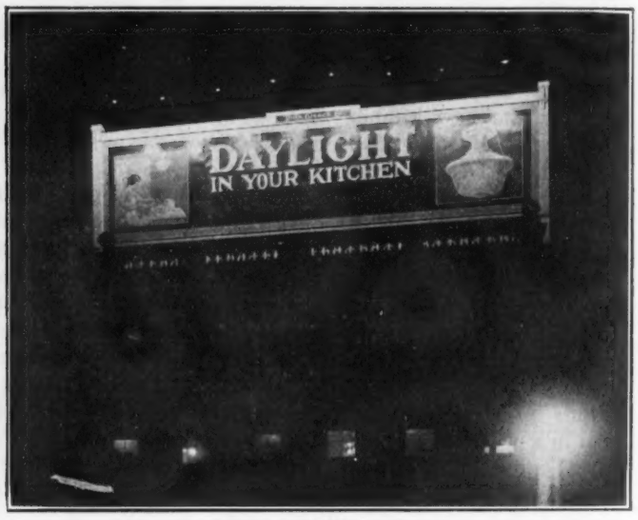
_____
Customer.

CARD USED BY SALESMEN IN TAKING ORDERS FOR LIGHTING UNITS AND CONVENIENCE OUTLETS

work and that the orders would be filled just as promptly as possible.

It was planned to bring the active sale of these units to a head toward the end of November, after the remarkable results for October had been recorded. This was scheduled for announcement in a newspaper advertisement calling attention to the fact that by a stated date the opportunity to secure the fixture installed at the established price would cease and briefly referring to the success of the drive. Of course, the sale of these units by local contractors and retailers would continue indefinitely on their own terms after the regular campaign ended.





LEFT—A CARLOAD OF KITCHEN-LIGHTING UNITS. RIGHT—BILLBOARD LIGHTING FEATURED THE CAMPAIGN

Separate Department Created

To facilitate the sales routine, the Hartford company set apart quarters on an upper floor of its office building for the use of the staff handling the campaign and virtually created a separate department for this work. Clerical records, salesmen's meetings, conferences, mail and telephone orders were cared for here. The routine of procedure from the receipt of an order to its completion was plotted graphically, and a corresponding chart was made up for procedure in case of withdrawal or cancellation.

Order cards stamped by addressograph were supplied to canvassers by the Hartford company. These carried the customer's name and were sorted according to streets to save time in the field. All sources of orders were given a serial number and recorded in a "daily register" which proved of the utmost value in keeping track of the orders and in making up the weekly payments to the sales organization. Buff cards were used to record orders taken in person and white cards (from the broadside) for mail orders. After being addressographed, the buff cards were turned over to the salesmen for use in the field.

Upon receipt of orders the cards were sorted by street numbers and registered; orders were then placed on the lighting company's stockroom for lamps; the Southern New England company received corresponding orders for lighting units, and the Corcoran Sales Company received orders for the payment of commissions, while the contractors received orders in geographical groups to execute the work. The lamps, wiring material and fixtures were delivered to the contractors by the lighting company and the jobber, and upon completion of the installation a signed report was turned over from the purchaser by the contractor to the lighting company and registered. After being held for thirty days each order was forwarded to the lighting company's accounting department for billing with the lighting bill. A reverse routine was followed in case of withdrawals or cancellations.

The contractors have been able to install from fifteen to twenty kitchen lighting units per day per man. Four girls were required for the routine of following out the orders. All sales were recapitulated daily on the register, with classification by agent number, date of sale and withdrawals.

Cash prizes were given to the salesmen by the Hartford company to a total of $500 and the commission was increased after the bogey originally set was passed. The following letter was sent to each trial customer upon the expiration of thirty days:

> The "Daylight" kitchen light which we put in for you on thirty-day trial has been in use for that length of time. Not having heard from you to the contrary, we would understand that you wish to keep it. We are therefore charging it to your account and inclose our bill. We hope that it is giving you just what it is made to give, a perfect light, like daylight, for less than 1 cent an hour.
>
> Any customers who choose to pay for this light in full instead of by installments with their light bills will receive a receipt in full if they remit for the total bill or for the balance due at any time.
>
> Thanking you for trying this new light and trusting that it is entirely satisfactory, we are, at your service,
>
> THE HARTFORD ELECTRIC LIGHT COMPANY.

It is planned to follow the kitchen unit campaign immediately by one to sell improved equipment to stores. This will probably consist of a 200-watt lamp with suitable fixture, and the territory will be canvassed with a smaller number of salespeople. It is hoped to sell at least a thousand such units in about one month.

Public Relations Foremost Utility Problem

THE inestimable value and great importance of harmonious public relations were emphasized again by Martin J. Insull at the fifteenth annual meeting of the Indiana Electric Light Association at French Lick Springs recently. From the electric service companies' viewpoint public relations cannot be anything but the best possible, otherwise the

individual companies will lose out and the damaging effect may even extend to neighboring companies or over the entire nation, declared Mr. Insull.

To secure the highest degree of good will, the best possible service must be rendered at the lowest possible rates, and in addition the importance of the utilities to the public as well as the peculiarities of the business must be carefully and fully explained.

Because electrical men know the utility business they are apt to think every one else does, said Mr. Insull, but it is very complex to the laymen. The educational process must be continuous. Because the older generation is ever giving place to a younger one the public must be made to realize that the owners of public utilities are the public, represented through banks, insurance companies and many small stockholders. It must be clearly explained how money invested in utilities will always redound to the prosperity and well being of the community and nation.

In endeavoring to acquire this much-sought good will of the public, companies must remember the difference between utility and commodity business, Mr. Insull warned. First of all, the public must be shown the necessity of a monopoly in the utility business. Then there is the financial difference. A commodity business may turn over its capital five times a year with 25 to 50 per cent return on its investment, whereas a utility can turn over its capital only once in five years, with only 6 to 8 per cent return. Another difference is that utilities do not sell packages; they sell service available on instant demand. How can the public know these things, asked Mr. Insull, if utilities do not explain them?

Commenting on a utility company's duties to the public and its security holders, Mr. Insull said that while a utility is obligated to give the best service at the lowest rates, the rates must not be so low that they endanger the possibility of procuring money for rendering this service. Rates might better be too high than too low. A utility's duty to its security holders is to handle the money intrusted to it so wisely, honestly and judiciously that their investment is safeguarded and a regular return assured. As a means of securing favorable public opinion Mr. Insull suggested:

1. Study and local application of the National Electric Light Association's public relations methods.

2. Bringing home to the utility employees the importance of improving public relations.

3. Co-operation with the public by laying all cards on the table. If a utility is honest, there is nothing to hide; if it is not honest, it should not be in business.

4. Co-operation with civic clubs and organizations.

In closing, Mr. Insull declared that a fully and correctly informed public offers sterile soil to the seeds of discord sown by demagogues.

Selling Appliances of Proved Quality Only

IN CONNECTION with its recent opening of an electric appliance shop, the Concord (N. H.) Electric Company put into effect the policy of selling only electrical household devices of tested quality. The accompanying advertisement, emphasizing the stability of the central station and other local merchandisers as compared with "here today and there tomorrow" concerns trying to unload devices of inferior grade upon the public, was inserted in the local press and aroused much favorable comment.

We Can't Run Away

Why not take advantage of that fact?

A few days ago a woman asked our assistance in repairing a certain electric appliance.

It was an inferior appliance. It had been sold to her by a salesman who burst into town, "worked fast" and disappeared.

There was no one to reimburse her, no one to make proper adjustment.

A local merchant would not have sold her that inferior appliance. This company—which submits all types of appliances to careful tests—would not have sold her that appliance.

And if we had, by error, she could have found us—like your other local merchants—right here in town, ready and willing to rectify that error.

If you haven't an electric vacuum cleaner, you aren't taking full advantage of your electric service. Let's bring a Eureka vacuum cleaner to your home and show you how it saves your time, your strength, your health. No obligation whatsoever for the demonstration.

CONCORD ELECTRIC CO.

CENTRAL STATION ADVERTISES PERMANENCE OF ITS BUSINESS

What Other Companies Are Doing

Kansas City, Mo.—The Kansas City Light & Power Company has opened a safety school for industrial superintendents. Sessions are to be held one night a week in the company's auditorium. More than 900 foremen, superintendents and employment managers have enrolled for this course, and over 500 have attended each of the sessions held so far.

Seattle, Wash.—The Puget Sound Power & Light Company recently held in Seattle the first electric cooking school conducted by a central-station company in the Puget Sound district. Heretofore such schools have been sponsored and conducted by one of the leading newspapers of the city in which the school was held. During the five days that the school was maintained more than 1,200 housewives were in attendance. Miss Bernice Lowen, electric cooking expert of the Edison Appliance Company, conducted the classes. The success of the undertaking was so pronounced that the company has determined to conduct a similar school at least three times a year to supplement the work of the company's own demonstrator, who gives weekly demonstrations and is prepared to give daily instructions to customers.

Fitchburg, Mass.—The saturation point on electric flatirons is still afar off for the Fitchburg Gas & Electric Light Company, judging from its sale of about one iron for every nine residential customers during the nine months ended Sept. 30. Washing-machine sales for eight months totaled $30,032, or nearly double the revenue from gas-range sales on this system. There are about seven thousand residence lighting customers on the electric lighting system.

Logansport, Ind.—Floyd Kearns, superintendent of the municipal electric light plant at Logansport, Ind., is taking steps to promote good will between the city and citizens through a series of inspection days at the plant. On two evenings recently the plant was thrown open to the public, at which time guides were provided to explain all the details of equipment. All buildings have been painted recently, and the plant has been equipped with a new ash-carrier system.

Digest of Electrical Literature

Including Brief Abstracts of and References to
Important Articles Appearing in the Scientific and Engineering Press
from All Parts of the World

Hydro-Electric Development and Steam Equipment

Operating Hydro-Electric Plants to Obtain Most Economical Output.—RALPH BROWN.—The method of keeping record of plant performance to obtain best economy of available water, operating in parallel with steam plants and obtaining maximum output from hydro-electric units are among the subjects considered.—*Power*, Oct. 16, 1923.

Power-Plant Problems of Steel Mills.—L. B. BREEDLOVE.—The efficiency of various forms of prime movers, importance of frequency, blowing and electric generating equipment and selling off-peak power are discussed. Several tables give actual operating figures, cost of plant and of operation and a comparison of consumption for two types of power-plant equipment.—*Iron Age*, Oct. 18 1923.

Study of Irregularity of Reaction in Francis Turbines.—ROY WILKINS.—Irregularity of reaction in hydraulic machinery causing vibration has up to the last few years been of relatively little importance and treated as a more or less necessary evil. With the advent of larger units, particularly for high heads, it became of prime importance that there be little or no vibration. In cases where vibration occurred a cut-and-try system of remedying it was usually resorted to and as little publicity as possible given to the procedure. For the study of such phenomena as vibration caused by irregularity of reaction manifesting itself in several impulses per second the electrical methods long since developed are admirably adapted, and this paper gives a brief description of a successful method of study.—*Journal of A. I. E. E.*, November, 1923.

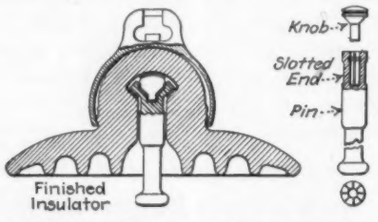
Generation, Control, Switching and Protection

Minimum Number of Hydro-Electric Units to Have in Service.—RALPH BROWN.—Factors that determine the number of machines to have in service, how loading of machines affects efficiency of the plant and methods of supplying wattless current to the system are considered.—*Power*, Nov. 6, 1923.

Simplified Method of Analyzing Short-Circuit Problems.—R. E. DOHERTY.—An abstract of this paper may be found in the ELECTRICAL WORLD report of the A. I. E. E. summer convention, July 7, 1923, page 18.—*Journal of A. I. E. E.*, October, 1923.

Modern Metal-Clad Switch.—The conditions which have to be met in rupturing large amounts of power, a general description of the switch gear as it is being designed and manufactured, control and operating details, speed of break, constructional details and contact design are among the subjects discussed.—*Electrician (England)*, Oct. 19, 1923.

Cone-Head Insulator.—E. ALTMANN.—The recent attempts to develop a suspension-type insulator without a cemented joint between the disk and the metallic pin have resulted in a number of designs. The present article describes the features of a new series of these insulators, the basic principle of which is the locking of the metallic pin within the conically hollow head of



SUSPENSION-TYPE INSULATOR WITH NO CEMENTED JOINT BETWEEN DISK AND METALLIC PIN

the porcelain, as shown herewith. The head of the soft-steel pin is tubular with several radial saw cuts. Within the hollow head of the porcelain is lodged a small pointed knob. The end of the pin is heated to dull red heat in an electric resistance welding machine, is inserted into the neck of the porcelain and by means of a simple toggle press the hot end of the pin is pressed against the internal knob, which spreads out the individual members of the slotted end of the pin and bends them against the inside of the hollow cone in the head of the porcelain. It is claimed that 10 tons tension is required to withdraw the pin, a tension far in excess of any practical occurrence and beyond the resistivity of the porcelain itself.—*Der Elektrische Betrieb*, Aug. 29, 1923.

Remote Control of Networks Without Pilot Wires.—J. BETHENOD.—A system for adjusting from a substation meters used for consumers who are supplied at two different rates, or to switch street lights on and off without the use of pilot wires, is in successful operation on the Marseilles (France) distributing system. To the middle wire of a three-wire direct-current supply line a small condenser and a 1,000-cycle single-phase generator are connected, one terminal being grounded. On the consumer's premises a relay in series with a condenser is placed between the middle wire and ground. This relay will either change the gear ratio on the meter, to make it record a different rate during a certain period, or it will close and open a switch controlling any desired circuit. The high-frequency current will in no way affect the normal direct-current supply. On the alternating-current supply lines a direct-current impulse accomplishes a similar purpose.—*Revue Générale de l'Electricité*, Oct. 13, 1923.

Transmission, Substation and Distribution

Underground Transmission with Substations Designed for Mines.—At the Lynch (Ky.) mines steam pressure of 200 lb. and 100 deg. superheat is furnished by three 750-hp. Stirling water-tube boilers to two turbo-generators each rated at 1,875 kva., 6,600 volts, three-phase, 60-cycle. In this large mine underground transforming and converting substations supplemented by ample copper feed the lines from which the power is drawn. Among the features considered are the power plant, the load variation and the distribution system, each of which is described.—*Coal Age*, Oct. 11, 1923.

Remodeling of an Industrial Substation.—E. C. SOARES.—When it became necessary to make changes in a step-down transformer substation at an industrial plant to receive energy purchased from a central-station system at 13,200 volts, some construction details of transformer house, buses and wiring layout were worked out that held the completed cost of the 1,450-kva. substation, including the building changes, to $6.20 per kva. The bill of material and installation details given show how the work was handled.—*Industrial Engineer*, November, 1923.

Transmission-Line Transients.—V. BUSH.—This paper, presented before the Swampscott convention of the A. I. E. E. in June, presents the results of an investigation on transmission-line transients recently performed at the Massachusetts Institute of Technology. The object of the research was to test experimentally part of the theory of transients and transmission lines and to investigate qualitatively certain phenomena of reflection and wave form.—*Journal of A I. E. E.*, November, 1923.

Units, Measurements and Instruments

Determination of Mechanical Performance by Means of Vibration Tests.—C. BETHEL.—There are several methods of testing machines that are subjected to vibration. Testing apparatus of this type is advisable because by its use weakness of design can be quickly eliminated. Several machines for this purpose are described.—*Electric Journal*, October, 1923.

Mechanical Computation of Root-Mean-Square Values.—L. A. UMANSKY.—After reviewing some prominent labor-saving methods the writer points out that the root-mean-square value can be quickly calculated by a mechanical device, which he describes.—*Journal of A I. E E.*, October 1923.

Illumination

First Low-Voltage Gas-Filament Lamp.—D. MCFARLAN MOORE.—For many years all luminosity due to the action of electricity in gases was associated with high voltages. The light beween the two terminal electrodes of a small Geissler tube, or of a tube lamp such as was used in the Moore long-tube system, is positive column light, which in a measure accounts for its much greater intensity and efficiency. Several years ago it was found that luminosity in gases could be produced solely by voltages as low as 110, but it was a negative glow light of low intensity that surrounded the metal electrodes in a bulb of rarefied neon gas. Although the problem was partly solved by the negative glow lamps, there remained the far more difficult problem of obtaining positive column light on low voltages. This paper announces the production of such lamps and contains also a brief résumé of the history of gaseous conduction and its many points of contact with electrochemistry. — *Paper presented before American Electrochemical Society at Dayton, Ohio,* Sept. 27-29, 1923.

Motors and Control

Operation of Polyphase Motors from a Single-Phase Supply.—G. WINDRED.—By connecting two phases of a motor winding in series across the mains, while the terminal of the other phase is connected to a point which is formed by the junction of an inductor and a resistor connected in series, and which are also connected to the main, it is possible to run polyphase motors on a single-phase supply. The characteristics of the machines when operating in this manner indicate that the majority of them are inferior to those of the polyphase motor proper but are sufficiently superior to the single-phase working to recommend this system where only a single-phase supply is available or where the application of polyphase presents difficulties, as in certain railway work where the elimination of the extra conductors represents a considerable saving in money and avoids awkward constructional work.—*Electrical Review (England)*, Oct. 12, 1923.

Effect of Insulation on Design.—R. E. FERRIS.—Insulation affects the design of the machine primarily in three ways —space required, heat-insulating qualities and mechanical qualities. These factors are treated theoretically and illustrated by actual examples.—*Electric Journal,* October, 1923.

Adjustable-Speed Motor Drives.—R. W. DAVIS.—Adjustable-speed motor drives as used in steel mills can be divided into four general groups: direct current, Sherbius or alternating-current commutator, frequency converter and Kraemer or rotary converter. The direct-current method is the oldest, a little later the Kraemer and Sherbius systems were brought out almost simultaneously, and the frequency-converter system is the newest application. Each of the four systems is described in detail. The author, summing up the three types of alternating-current variable-speed motors, claims that the Sherbius and frequency-converter system are best suited for 25-cycle operation and the Kraemer type for 60-cycle operation.—*Proceedings of Association of Iron and Steel Electrical Engineers,* October, 1923.

Heat Applications and Material Handling

Lifting Magnets.—Some recent types of lifting magnets are described with eleven photographs illustrating their adaptability to various shapes of materials. Circular, square or rectangular magnets with flat-pole surface are chosen for handling ingots, bars or plates. A hollow, spherical pole surface gives best results for lifting a ball-shaped scrap breaker. When materials with very uneven surface have to be handled, magnets with spring-mounted movable poles are the best suited. It is mentioned that magnets are not safe for lifting loads of a temperature of more than 950 deg. F., because iron loses most of its magnetic properties above this heat, becoming non-magnetic at 1,400 deg. F. Modern magnets are wound with aluminum conductors with no other insulation but aluminum oxide applied by a special chemical process. To avoid a rush of current a controller with a resistance step on the first contact is used. The same controller permits current reversal to drop the load quickly. A standard circular magnet of about 50 in. diameter weighs 1.1 tons, consumes 3.3 kw. and has a theoretical lifting force of 28 tons. — *Bulletin Oerlikon,* September, 1923.

Industrial Applications of Welding and Cutting and Their Respective Possibilities.—A report covering all branches of the welding art, divided into sections dealing with arc welding, gas welding, thermit welding, carbon cutting and gas cutting. A clear picture of the extent and importance of these applications at the present time is given in this thirty-seven-page article.—*Journal of American Welding Society,* October, 1923.

Electrophysics, Electrochemistry and Batteries

Discharge Phenomena on Large Rectifiers.—M. SCHENKEL.—The author describes extended research work, done to solve the problem of why it is necessary to insulate the negative electrode from the metallic vacuum vessels on large mercury-arc rectifiers. It has been found from exact measurements that the metallic vessel participates on the discharge. This will cause a gradual loss of the vacuum, a pitting of the metallic walls, "backfiring" and short-circuits. It is recommended not only to insulate the vessel completely but also to keep all metallic guides for the arc far away from the arc itself. Rectifiers built according to these rules show marked safety against internal short-circuits.—*Elektrotechnische Zeitschrift,* Oct. 11, 1923.

Crystalline Form of Electrodeposited Metals.—W. BLUM and H. S. RAWDON.—A simple theory of the probable mechanism of crystal formation in electrodeposition is outlined. The principal types of crystalline structures observed in electrodeposits are classified and the conditions which tend toward the formation of the different types are discussed.—*Paper presented before the American Electrochemical Society at Dayton, Ohio,* Sept. 27-29, 1923.

Origin of Ions in the Unsustained Glow Discharge.—K. T. COMPTON and T. E. FOULKE.—It is shown that there are sufficient residual ions present in any gas to start a discharge when a sufficiently high voltage is applied. Attention is drawn to the application of the Einthoven galvanometer registering minute currents for very short intervals of time.—*General Electric Review,* November, 1923.

Telegraphy, Telephony, Radio and Signals

Telephone Distribution Systems in Large Buildings.—F. M. SIMPSON.—Owing to the type of buildings generally employed and the number of telephones to be served, the work will either be unsightly in spite of all precautions to the contrary or costly alterations will have to be made after the completion of the building to insure effective concealment of the wires, unless suitable facilities are provided in advance for accommodating the telephone cables and wires and for running these through the walls and floors. Methods for determining the best type of construction for a particular building are given.—*Construction,* October, 1923.

Study of Radio Signal Fading.—J. H. DELLINGER, L. E. WHITTEMORE and S. KRUSE.—During the years 1920 and 1921 a study was made of the variations of intensity of received radio signals of high frequency or short wave length. The investigation was conducted with the assistance of the American Radio Relay League. During the tests from five to ten radio stations transmitted signals in succession. These signals were received simultaneously at about a hundred receiving stations, whose operators were provided with forms for recording the variation in the intensity of the signals as received. Particular attention was given to the intensity of signals, the fading of signals, the prevalence of strays or atmospheric disturbances and the weather conditions existing at the time of transmission. An analysis was made of the reports received, and summary tables are given which point out possible relationships between the received signal intensity, fading and strays and the weather conditions existing at the time.—*Scientific Paper No. 476 of the Bureau of Standards.*

News of the Industry

Chronicle of Important Events and General Activities, Announcements and Reports of Association Meetings, Court Decisions and Commission Rulings and News of Electrical Men

Madden Backs Ford Plan

Chairman of House Appropriations Committee for Power Plant to Replace Gorgas

ACCEPTANCE of Henry Ford's offer for the Muscle Shoals water-power and fertilizer project, through government construction of a new steam auxiliary power plant to replace the Gorgas plant disposed of recently to the Alabama Power Company, is provided in a bill prepared by Representative Madden of Illinois, chairman of the appropriations committee, for introduction in the new Congress.

The bill will be introduced either by Mr. Madden or by Representative McKenzie of Illinois of the committee which originally brought forth the legislation which died in the last Congress. It will be similar to the original legislation except for the addition of a section designed to meet conditions resulting from the sale of the Gorgas plant. Under the new section Mr. Madden would have the government, through the War Department, substitute an auxiliary steam-power plant capable of developing 40,000 hp. The bill would authorize construction of the plant directly by the government or its construction under contract by Henry Ford or his corporation. Another provision would authorize the War Department to acquire, by condemnation or otherwise, a site for the steam-power plant on the Black Warrior River near Lock 17 and a strip of land connecting Dam 2.

It is stipulated that the cost of the new plant should not be more than the amount received by the government—about $3,500,000—from the sale of the Gorgas plant.

FERTILIZER-PRODUCTION FEATURE

Mr. Madden's attitude admittedly increases the likelihood of the Ford plans being indorsed by Congress. Entirely apart from the importance of his position, he possesses powerful influence among the conservative Republicans, the portion of the House membership relied upon to defeat the Ford bill.

In conversation with the Washington correspondent of the ELECTRICAL WORLD, Mr. Madden admitted that he is not informed as to the important offers for Muscle Shoals which are said to be in prospect, but he reiterated his belief that Mr. Ford is in a better position than any one else to develop that property. Mr. Madden confirmed the statement that he is backing the Ford offer principally because of its fertilizer feature, under which Mr. Ford would be required to make an immediate investment of about $50,000,000. The government can afford, Mr. Madden believes, to write off its expenditures at Muscle Shoals if it assures the farmers adequate supplies of fertilizers at low cost.

Bernard M. Baruch, formerly chairman of the War Industries Board, is quoted by Senator Ladd of North Dakota as favoring the Ford proposal.

New Jersey and New York Suits to Be Heard Jointly

The United States Supreme Court on Nov. 19 granted a motion permitting the State of New Jersey to file an original bill against the Federal Power Commission to enjoin the commission from exercising authority over water-power development within New Jersey and to test the constitutionality of the federal water-power act. The New Jersey case will be expedited and will be heard jointly with a similar suit against the commission by the State of New York soon after the first of the year.

Said McKinley Interests Have Kansas City Company

It is reported that the Illinois Power & Light Corporation, which is the consolidation of the McKinley and the Studebaker interests organized last spring, has acquired $5,000,000 par value common stock of the Kansas City Power & Light Company from J. Ogden Armour of Chicago and his associates, thus gaining control of the Kansas City company for the Illinois Power & Light Corporation's parent company, the North American Light & Power Company, which has its head office at Portland, Me.

Southern Power Company Has Resumed Full Service

The curtailment program of the Southern Power Company which had been in effect for several weeks terminated on Monday of this week, when full service was resumed. There has not been any great rainfall since the restriction began, but the full co-operation of the manufacturers in the curtailment program has brought about a filling of the reservoirs and the water heads are now back to a normal basis. The company believes that with this normal water supply and hoped-for frequent rains there will not be any more trouble.

For Sale of City Power

Two Plans in Political Fight in Washington State—Opponents of Both May Enter Contest

THE development of hydro-electric power in the State of Washington promises to be the battleground on which the next state election will be fought, with the possibility of a three-cornered fight looming.

State Representative Homer T. Bone of Tacoma has announced that he will carry the fight for the free sale of power throughout the state. He attacks the utility companies, declaring that for taxation purposes they file figures about one-sixth the size of those filed for rate making. Mr. Bone introduced into the House at the last session a bill providing for unrestricted sale of electrical energy by cities and fought the bill successfully through the lower branch of the Legislature. The bill failed to get out of the Senate committee, but succeeded in drawing out a substitute bill, known as the Reed bill, after its father, Mark E. Reed, Speaker of the House.

The Reed bill, admittedly the less obnoxious to the power companies, provides for the sale of electrical energy by municipalities outside their limits, but provides also for a 5 per cent gross earnings tax. This bill, Mr. Bone maintains, would in a measure cripple the effectiveness of the municipal power plants by detracting from net earnings. The Reed bill will go before the voters.

Owing to the mass of voters in cities directly interested in the power-sale question, it is believed by politicians that this will be the main issue of the coming political campaign. Seattle and Tacoma both have municipal power plants, Bellingham has acquired a site for one, and Aberdeen has plans for such a project. Adjacent to these cities are numerous smaller communities desirous of cheap electric power.

One New Unit at Essex Plant Ready; Two More Follow

The first unit of the new installations at the Essex plant of the Public Service Electric Company at Newark, N. J., has already been placed in service, adding 33,300 kva. to its rating. In addition to this unit, two more will be completed early in 1924, adding 66,600 kva. more. The company, according to Vice-president John L. O'Toole, expects that its total energy sales in 1923 will exceed a billion kilowatt-hours.

Interrelations of Manufacturers' Societies

President Timmerman of Electric Power Club Discusses Them at French Lick Meeting—Procedure for Setting Up Standards—Rural Electrification

THE Electric Power Club held the largest meeting in its career at French Lick Springs, Ind., this week, with 130 or more in attendance. Since the adoption of standards has been delegated by the club proper to its sections, the actual decisions at club meetings are very few, the meetings of the sections being largely devoted to the preparation of standards for subsequent action by letter ballot.

In his presidential address A. H. Timmerman discussed the proposed enlargement of the club and counseled that such action should not be taken without full study of the effect of further consequent subdivision and of making the club too clumsy. He said that a study was being made of the possibility of more intimately articulated action between the club and the American Manufacturers of Electrical Supplies, thus relieving the Electrical Manufacturers' Council of some of its present routine burdens. At present any matters mutually concerning the club and the A. M. E. S. must be taken up through the council. Mr. Timmerman also pointed out that the club and the American Institute of Electrical Engineers are now formulating methods of arriving at standards which interest both, so that ultimately there will be but one set of American electrical standards—these to be American Engineering Standards Committee standards found to be satisfactory after actual experience.

Mr. Timmerman further urged that manufacturers quickly adopt the plan of keeping records or statistics of production on the basis of capacity or units produced, rather than (or in addition to) monetary value. Fluctuating money value in the past ten years has made statistics on the latter basis most unsatisfactory and meaningless as a measure of real manufacturing activity, he said. He avowed his belief that the present available business in horsepower is fairly well fixed and that it is only by opening up new applications that a large increase in demand will be made.

RURAL ELECTRIFICATION

J. C. Martin of the Middle West Utilities Company, and formerly Western editor of the ELECTRICAL WORLD, made an address on the present situation in rural electrification and pointed out the opportunity of the future in the way of supplying electrical equipment to the farm. This is, of course, Mr. Martin pointed out, not an immediate possibility; but he said he was endeavoring to enlist the interest of electrical manufacturers in the program now under way to find out how to electrify the farms.

As shown by the interest in and discussion of the progress report presented by F. M. Kimball, the club is studying very carefully the question of how long manufacturers of electrical equipment should keep patterns and dies in order to supply renewal parts quickly. Involved in this question are not only the length of life of the equipment and the consequent determination of how long a manufacturer may thus be obligated to be ready to supply renewal parts, but also the business policy of maintaining good will by being able to furnish renewal parts at any time. Practices of various companies were discussed, but no decision was made till further study could be followed out.

S. L. Nicholson talked entertainingly of his trip to New Zealand, Australia and India and indicated to the club members the possibilities for export business in those countries. The tariff situation in the British dominions he visited, coupled with the desire to buy British goods, is one detriment to American export business; but nevertheless Mr. Nicholson concluded as a result of several months' study that a real and growing opportunity does exist which should be watched closely and followed up by American manufacturers.

To Boost Electric Ranges

N. E. L. A. National Commercial Section Discusses Problems at Salt Lake Group Meetings

THE National Commercial Section of the N. E. L. A. met in Salt Lake on Wednesday of this week for a two-day session with a large and representative attendance from both the East and the West. The group and committee meetings were characterized by unusual interest and enthusiasm as well as by the constructive nature of their work. The interest shown indicated that the plan of delegating the major portion of the detail work to the geographic divisions is stimulating interest in association activities. This in turn is leaving to the national section the needed opportunity to work on the larger problems and at the same time to coordinate its work.

The plans of the Lighting and Power Bureaus were presented, and the unusual opportunity for developing the classes of business with which they are concerned was brought out. The Appliance Bureau outlined a constructive program, especially in the range meeting, which was of more than usual interest. The plan of the Northwest Geographic Division to make a thorough investigation of every phase of the electric range problem was unanimously indorsed. The executive committee of the National Commercial Section has been asked to make the necessary appropriation to carry on this work in a thorough and satisfactory manner.

A general meeting was scheduled for the second morning, to be followed by an executive committee meeting in the afternoon and a banquet in the evening, at which the delegates were to be the guests of the Rocky Mountain Electrical Co-operative League.

Credit Problems to Fore

Speakers at Chicago Condemn Long-Term Commitments and Discuss Delinquent Debtors

SPEAKING at the twenty-eighth annual meeting of the Central Division of the Electrical Credit Association, held in Chicago on Nov. 20 and 21, E. B. Seitz, secretary of the American Washing Machine Manufacturers' Association, condemned the tendency toward building up sales by long-term commitments. When the present period of high labor and commodity prices ends, he said, the companies surviving will be those that have paid strict attention to tangible investments and not fixed assets. Mr. Seitz declared that in his own field, through educating the contractor-dealers, washing-machine manufacturers have reduced their time of payments from ninety-seven to eighty-two days.

National President E. W. Shepard, New York, urged that credit men teach their customers the relations between gross profits, selling expense and turnover. He contended that the losses during the past three years could have been avoided had credit men known more of their customers' problems.

Much interest was shown in a system explained by S. C. Greusel, Milwaukee, whereby the electrical credit men and contractor-dealers pay the expenses of a traveling accountant to check over the books of local contractor-dealers. He felt that credit men should be liaison officers. A committee was appointed to look into this system.

"Creative credit management" was considered by O. J. Condon, who outlined various means of cultivating good will. A discussion of how slow-paying customers should be handled took place, D. W. Parsons of Chicago advocating a sympathetic attitude and the use of the E. C. A. forms.

The high cost of distribution was ascribed by Frank E. Watts of Cleveland to too much competition and too many retail dealers. M. F. Bacon discussed collection correspondence from the sales manager's viewpoint.

Wednesday afternoon was experience day. A general feeling seemed to exist that the forms had not been employed frequently enough in reporting delinquents since only 65 per cent of the members used them.

The following officers were elected for the ensuing year: President, J. H. Taylor, Chicago; vice-president, W. Scott Long, Chicago; national board member, B. P. George, Chicago. Frederick P. Vose was re-elected secretary-treasurer. The total attendance was 143.

Wisconsin Rate Settlement

Agreement Between Central Station and Forty-nine Cities Is Before State Commission

LOWER electric light and power rates will be placed in effect on Jan. 1 by the Wisconsin-Minnesota Light & Power Company in forty-nine Wisconsin cities and villages served by it if an agreement finally reached by officials of the company and representatives of the cities meets with the approval of the Wisconsin Railroad Commission. The basis of the projected settlement has not yet been made known, but it is announced that the reduction in electric rates in La Crosse alone will be between 14 and 15 per cent, or about $60,000 a year.

For nearly two years these forty-nine cities have been fighting before the commission and the courts for lower rates. The fight centered on a method of determining rate schedules according to the proximity of cities and villages to the source of generation instead of under the "loop system," by which cities remotely situated from the source of supply were charged the same rates as those near by, the "loop" system having been declared illegal by the Wisconsin Supreme Court. Following the Supreme Court's decision officials of the company applied for emergency rates from the commission, but this request was refused. The case was then carried to the federal courts, and the rates now in effect were established by federal court proceedings. When the Byllesby interests acquired the Wisconsin-Minnesota Light & Power Company efforts to reach a settlement were at once begun, and it is considered probable that the commission will approve the agreement.

Oklahoma Electrical Men Hear About Good Will

Features of the Tulsa conference of the first and second districts, Electrical Division, Oklahoma Utilities Association, on Thursday, Nov. 15, were addresses by C. L. Proctor of Joplin, Mo., general manager of the Empire District Electric Company and chairman of the electrical division of the Oklahoma association, who suggested that public utility officials had become little less than public officials in the importance of their responsibility to the people and urged complete fidelity in the discharge of this responsibility, his remarks being in response to the address of welcome by William Holden, secretary of the Tulsa Chamber of Commerce; by J. F. Owens of Oklahoma City, vice-president and general manager of the Oklahoma Gas & Electric Company, who spoke on "Public Relations" and said that public good will today is an absolute essential in the successful operation of a public utility; by C. H. Kretz of Okmulgee, general manager of the Oklahoma Power Company, who discussed "Local-Plant Versus High-Line Service"; by Fred W. Insull, president of the Public Service Company of Oklahoma and of the Oklahoma Utilities Association, who urged closer co-operation of utilities in handling their problems of a mutual character, and by E. F. McKay, manager of the association, who declared that newspapers today reflect rather than create public sentiment and that by a constant effort through the news and advertising columns of the press the public can be educated into a proper attitude.

H. N. Bates of Tulsa, district manager of the Public Service Company of Oklahoma, was elected president, and William H. Crutcher of Muskogee, district manager of the Oklahoma Gas & Electric Company, secretary, of the joint first and second districts of the Electrical Division. Muskogee was chosen as the meeting place for 1924.

Plans of Central Maine Power Will Cost $10,000,000

Plans for further hydro-electric developments aggregating $10,000,000 on the Androscoggin and Kennebec Rivers were announced this week by the Central Maine Power Company. To a representative of the ELECTRICAL WORLD Walter S. Wyman, general manager, stated that it is hoped to start work on one or both of these developments during 1924. The Androscoggin project includes the construction of a dam above Lewiston for the development of 50,000 hp., and the Kennebec project involves the building of a dam 90 ft. high above Bingham, with an ultimate development of 65,000 hp. and a storage capacity of about 1,000,000,000 cu.ft. Both projects include extensive generating-plant construction, with substation facilities and additions to the present transmission system. About two years will be required to complete the work.

Rapid progress is being made upon a steam-plant extension at Lewiston, which is interconnected with the hydro-electric system of the former Androscoggin Electric Company, now a part of the Central Maine system, and with the main lines of the latter at Gardiner. An interconnection between the Central Maine and Cumberland County Power & Light Company (Portland) systems is also under way.

Southeastern N. E. L. A. Men Gather in Tampa

The eleventh annual convention of the Southeastern Division, National Electric Light Association, opened in Tampa, Fla., at the Hillsboro Hotel, on Nov. 19, with an attendance of two hundred. The meeting lasted four days, with President W. R. Sammons, Knoxville Power & Light Company, in charge of the sessions. The program as published last week was carried through successfully. The ELECTRICAL WORLD'S report is necessarily held over.

Jobbers' Open Meetings

Delegates at Buffalo Hear Recommendation for Institute to Develop Contractor-Dealer

THE concluding day of the annual winter convention of the Electrical Supply Jobbers' Association, held this year at Buffalo, as noted last week, was devoted to open meetings. Frederick P. Vose, general secretary of the National Electrical Credit Association, who for several years has appeared before this body in the guise of a mild pessimist, expressed himself as confidently optimistic of the immediate future before the electrical industry. His address appears at length in this issue.

David Sarnoff, vice-president and general manager of the Radio Corporation of America, sketched present conditions in the radio business and gave a graphic picture of its future. About 90 per cent of the sales of the Radio Corporation of America up to date, he said, have gone to the electrical trade, and the electrical jobber and dealer is well intrenched as a distributor of radio outfits and parts.

An interesting analysis of the present condition of the electrical contractor was made by O. Fred Rost, president Newark (N. J.) Electrical Supply Company, who characterized the electrical industry as a four-cylinder motor, the cylinders to represent manufacturer, jobber, central station and contractor-dealer, and the contractor-dealer's cylinder missing fire. Mr. Rost urged a serious effort on the part of the electrical industry working co-operatively to study the contractor-dealer as a common problem and establish an institute, preferably under the guidance of the Society for Electrical Development, to train men to do field work among the contractors for the purpose of making them better merchants and business men. From experience he has had in his territory he showed how immediately profitable it was to the jobber and the manufacturer to increase the individual prosperity of contractor-dealers and expressed the belief that a part of the appropriation now being spent by manufacturers in publicity might well be apportioned for this educational work.

COMPARISON WITH HARDWARE MEN

A comparison of conditions confronting the hardware jobber and the electrical jobber was presented by H. O. Smith, Hardware & Supply Company, Akron, Ohio. There are about ten times as many electrical jobbers as there are hardware jobbers, he said. The hardware man pays far more attention to efficient material handling and habitually locates his warehouse by the railroad siding in a low-rent district. He does not make so many direct shipments as the electrical jobber. The electrical jobber, on the other hand, has developed as a far more effective distributor of specialties and is doing a better selling job. There are many practical lessons, however, which he may learn from a careful study of the older wholesaler.

Federal Power Commission Kept Busy

The Diamond Creek Dilemma—Projects for Tallapoosa, Yuba, Merced, Wynoochee, Collitz and Gasconade Rivers Seek Board's Authorization

THE Governor of Arizona has declined to extend the time of the state license covering the Girand development at Diamond Creek on the Colorado River. Mr. Girand has filed the Governor's letter with the Federal Power Commission. This puts it squarely up to the commission to take action in this case, which involves a ninety-million-dollar transaction. If the commission refuses to take action before Dec. 26 on the Girand license, it will mean, unless the Governor reverses himself, that the Arizona copper companies will no longer be committed and may decide to rely for a longer period on fuel oil. The decision to turn to hydro-electric power was made at a time when the prospect for obtaining adequate supplies of fuel oil at reasonable prices was not so good as it is at present. Arizona would be the greatest sufferer were the scheme to fall through. For that reason some are of the opinion that the state executive may change his mind once that he is sure the commission will not grant the Girand license before Dec. 26.

On the other hand, the Federal Power Commission must face a heavy moral, and possibly a legal, responsibility if through failure to grant a license Mr. Girand, who has complied with all the conditions of the preliminary permit, should be subjected to great losses.

Projects in Many Regions

The Alabama Power Company has applied for a license covering the remainder of its project on the Tallapoosa River. A year ago the company secured a preliminary permit for a series of developments. In June a license was issued covering the company's Cherokee Bluffs unit, which develops 100,000 hp.

The company now has completed its survey of the entire stream, much of the work being done by aërial photography. The survey discloses that it will not be possible to obtain enough storage capacity in the manner planned. For that reason it now is proposed to increase the height of the Cherokee Bluffs dam from 105 ft. to 150 ft. This change will entail very great expense, involving the relocation of a section of railroad, the raising of highway bridges and approaches and the removal of two cemeteries.

Five additional dams are to be constructed above the Cherokee Bluffs dam, which will have a combined head of 306 ft. The fifth dam will be 140 ft. high. The combined installed power at these additional dams will be 114,000 hp.

The Excelsior Water & Power Company of San Francisco has applied to the commission for a license covering a 4,000-kva. project to be developed by enlarging the old Excelsior ditch, which was built for mining purposes in 1854. The plan is to install a penstock to utilize a fall of 750 ft. to a power house on the South Fork of the Yuba. This project is in conflict with the scheme for a comprehensive power and irrigation project proposed by the same company, and whenever the large project goes through the smaller development will have to be scrapped.

With the idea of utilizing portions of power resources during the period that arrangements are being made for larger developments, the commission is expected to grant a license to Thomas C. Clarke for a small project on the South Fork of the Merced River in Mariposa County, Cal. The proposed development is in conflict with the large project of the San Joaquin Light & Power Corporation.

The question which has been raised by the engineers of the commission as to the safety of a dam as thin as that proposed by the Merced Irrigation District will not delay work on the structure. Col. William Kelly, the chief engineer of the commission, has just returned from a visit to the site and has agreed that the company shall proceed with the construction to a point 60 ft. above bedrock. The plans call for a dam 320 ft. high.

Sanderson & Porter, lumber manufacturers and the operators of a public utility power plant which serves the Gray's Harbor area in the State of Washington, have taken up with the commission a proposed development of water power in the Wynoochee River, a tributary of the Chehalis River.

The Cascade Power Company has filed a declaration of intention with the commission announcing its plan to develop 17,000 hp. on the Collitz River at a point between Portland and Seattle, Wash.

Clarke E. Jacoby and E. L. Williams of Kansas City, organizers of the Central Missouri Power & Water Company, have applied to the commission for a preliminary permit covering a development on the Gasconade River.

Byllesby Acquires Coast Valley Gas & Electric

In acquiring the property of the Coast Valley Gas & Electric Company of California H. M. Byllesby & Company have obtained a 380-mile transmission and distributing system serving an area of 3,400 square miles. This utility company supplies fourteen communities having a total population of 25,000, including the towns of Monterey, Pebble Beach, Pacific Grove, Salinas and Coburn. The principal industry in the Salinas Valley and the adjoining territory is fruit growing and the raising of sugar beets.

The energy supplied by this company is purchased on a long-time contract from the Pacific Gas & Electric system, although it has reserve generating plants at Monterey, Salinas and King City. Present gross earnings are at the rate of $750,000 annually. Although no official confirmation has been made, this property will possibly be operated as a subsidiary of the Standard Gas & Electric Company and ultimately merged with one of the larger subsidiary operating companies of the Standard Gas & Electric Company in California.

Arkansas Utility Men Have Optimistic Outlook

The sixteenth annual convention of the Arkansas Utilities Association, held in Pine Bluff on Nov. 15 and 16, was attended by 125 utilities men from all parts of the state. One business session was held each morning, the afternoons and evenings being devoted to special and social events.

Optimism characterized the proceedings. President S. A. Lane in his address called attention to the prosperous conditions of the public utilities of the state. He commended the members for their hearty co-operation with the publicity department of the Arkansas Public Service Information Bureau, and dwelt upon the part that the public utilities play in the upbuilding of the resources of the state and the reaction of the state's prosperity on the public utilities.

Governor McRae addressed the delegates, saying: "We cannot develop our state unless we develop its public utilities, and I want you to feel that I am in sympathy with your programs of development."

A technical paper on "Three Phases of the Solution of the Power-Factor Problem" was read by W. A. Layman, president Wagner Electric Corporation, St. Louis.

Frequent mention was made of the Remmel dam and hydro-electric station under construction on the Ouchita River by the Arkansas Light & Power Company, one of the largest projects in the Southwest, and of the possibilities of Arkansas becoming a leading manufacturing state when its water power has been developed. On the day before the convention met the tenth annual managers' meeting of the Arkansas Light & Power Company was held at the dam site. The construction work on the dam was inspected, and speeches were made by company men.

The next meeting of the Arkansas Utilities Association will be held in Hot Springs at a date to be fixed by the executive committee. Officers were elected as follows: President, J. L. Longino, vice-president and general manager Arkansas Light & Power Company; first vice-president, R. C. Coffy, vice-president and general manager Fort Smith Light & Traction Company; second vice-president, S. R. Brough, superintendent Arkansas Water Company; secretary-treasurer, Rex Brown, commercial manager Arkansas Central Power Company.

Merrill's Recommendations

Suggests to Congress Improvements in Water-Power Act—Insists on National Power

IN THE forthcoming report to Congress of the Federal Power Commission, prepared by O. C. Merrill, its executive secretary, it is recommended that the water-power act be amended so as to place the administration of all projects, whether authorized under this law or prior to its enactment, in the commission. At present the individual departments continue to administer the water-power permits issued by them prior to the enactment of the water-power act. Suggestion is also made that the act should be amended so that the commission may employ a sufficient force to carry out the duties which the act imposes upon it. The report recommends further that the act be amended so that the amounts collected for the purpose of reimbursing costs of administration, including the portion now being set aside in the headwater improvement fund, be placed in a special fund to be devoted exclusively to the purpose for which collected and to be expended under the direction of the commission.

NATIONAL CHARACTER OF POWER

"Since water powers will form an essential part of any comprehensive superpower system," Mr. Merrill says, "the controversies concerning them require early solution in order that the way may be cleared for carrying out the general program. This program will be much wider than the territory or the authority of any individual state. State interests nevertheless must be harmonized in policy and program, which will be to the common interests of them all. This will require co-operative action and reasonable uniformity of legislation. There must be no state barriers against the interchange of energy. There must be no type of development that cannot become an integral operating part of the combined system. Legislation which interferes with the program should be repealed or modified; necessary affirmative legislation should be had; public officials of both state and nation should lend the program their support and the industry itself should harmonize its own conflicting interests. It should no longer be permissible for any utility to draw plans for future extension except in such manner that interconnections may be effected readily whenever its territory merges with that of any other utility."

Control of Iowa Southern Utilities Changes

The controlling interest in the Iowa Southern Utilities Company, which, with operating headquarters at Centerville, serves forty-one cities and towns of Iowa with electric light and power and gas and operates a street railway and an interurban line, has been sold by David G. Fisher of Davenport, to George M. Bechtel, a well-known Iowa capitalist. Mr. Fisher has resigned as president and director of the corporation.

This utilities company owns a network of transmission lines in Iowa, south of Des Moines and southwest of Ottumwa. The corporation was organized by Mr. Fisher and his associates in 1916 to serve Leon and three adjacent towns. Since that time the company has extended its lines until town, farm and mine districts in twelve counties are served. In 1919 the corporation purchased control of the Centerville (Iowa) utilities and in 1921 of those of Newton.

Government Appointments for Farm Survey Made

William A. Durgin, chief of the Division of Simplified Practice, Department of Commerce, has been assigned by Secretary Hoover to represent the department on the Joint Committee on the Relations of Electricity to Agriculture, which, as already announced in the ELECTRICAL WORLD, is with the help of the federal government to make a world survey of the farm power situation. Mr Durgin will be actively in charge of the survey to determine how much electricity is being used in foreign countries in agricultural work, how it is being utilized, how the service is being taken to the farms, and so forth. The development of a plan for the standardization of electrical farm equipment will also be worked out under the direction of Mr. Durgin.

Charles A. Bissell, Bureau of Reclamation, Department of the Interior, has been assigned by Secretary Work to represent that department on the committee. The details of the program to be undertaken by the Department of the Interior have not yet been made public, but naturally they will concern the development of water power and other natural resources.

Street-Lighting Tables for 1924

FOLLOWING its practice for thirty-five consecutive years, the ELECTRICAL WORLD has prepared tables showing the proper time for lighting and extinguishing street lamps. The tables for 1924 are now ready, and a copy of them will be sent free to any subscriber upon request to ELECTRICAL WORLD, Tenth Avenue and Thirty-sixth Street, New York. For more than one copy a charge of 25 cents each is made to cover a portion of the postage, printing and compilation costs.

Big New Mississippi Plant

United Light & Railways Company Is to Build One at Davenport Larger than Keokuk

A SUPERPOWER steam plant costing $10,000,000 and generating eventually at least 200,000 hp., where electricity will not only be manufactured for the consumption of the surrounding industrial community but will be stepped up to 66,000 volts or 132,000 volts for long-distance transmission, will be built on the banks of the Mississippi River, 2 miles above Davenport, Iowa, according to an announcement of Vice-president and General Manager B. J. Denman of the United Light & Railways Company, which, with its headquarters at Grand Rapids, Mich., controls the Tri-City Railways & Light Company, serving Davenport as well as Rock Island and Moline, Ill., and other places.

A tract of 91 acres with a considerable water frontage has been purchased by the United Light & Railways Company, and surveys preliminary to actual construction have already been begun. Construction will commence in a short time and will be pushed through the winter, and it is expected that electrical energy from the new plant's first unit will be sold next year.

TERRITORY WILL BE TRIPLED

The new plant in its ultimate stage wil have a larger capacity than the Keokuk Dam water-power plant. It wil be the largest station between Chicago and Kansas City and between the Twin Cities and St. Louis. Located along the right-of-way of the Clinton, Davenport & Muscatine interurban railway and also along the line of the Milwaukee road, the power site will be easy of access for coal deliveries. It will have river wharfage in case coal-barge transportation on the Mississippi from lower Illinois and Ohio River mines proves practicable in the future. A network of high-tension lines, tapping a rich manufacturing territory within 100 miles of the Tri-Cities, will eventually radiate from the new plant at Davenport, Mr. Denman states. By means of it the territory served will be tripled.

The first section of the plant will be 160 ft. x 220 ft. in ground dimensions and 110 ft. in height, of concrete and steel construction with brick exterior. This first unit will require an approximate investment of $2,500,000. It will contain a 35,000-hp. Westinghouse turbo-generator, which was purchased nearly a year ago, together with the necessary boilers, stokers and condensing equipment. The steam pressure at the boilers will be approximately 425 lb., making the Davenport development one of the high-pressure plants in the country.

Originally options were obtained on two sites in Iowa and three in Illinois. At one time it was about decided to locate the plant at Moline or elsewhere on the Illinois side, but the site desired could not be had.

Texas Companies Spending Great Sums This Year

Electric power and light companies in the larger cities of Texas are spending more than $15,000,000 this year in improvements, extensions and betterments, as shown by figures compiled by C. E. McBride, assistant secretary and treasurer of the Dallas (Tex.) Power & Light Company. The compilations of Mr. McBride show that Dallas leads the list of Texas cities in such expenditures with its budget of $15,000,000 covering a five-year period.

The 1923 outlay for Dallas, which includes improvements under way and proposed at outlying stations and the addition to the Dallas plant of the Dallas Power & Light Company, is $5,000,000. The Houston outlay for 1923 is $6,000,000, which includes the first unit of the new four-million-dollar power plant which is now being built and improvements at outlying stations. Fort Worth is expending $500,000 in improvements for 1923, while San Antonio's outlay amounts to $2,000,000. A new electric plant is being built at Eastland at a cost of $2,000,000.

Mohawk Valley Company Takes Over Two Others

The Mount Morris Water Power Company and the Mount Morris Illuminating Company have been taken over by the Mohawk Valley Company of New York City, which controls the Rochester Gas & Electric Corporation. The two companies thus absorbed will retain their old names, and Robert M. Searle, president of the Rochester company, will act as president of both.

C. L. Ladle, former State Superintendent of Public Works, will have supervision of the Mount Morris properties, as well as of the project of installing a new storage dam in the Genesee River there. T. E. Barnard will have immediate charge of the companies.

Manila Electric Company Expands Plant

A material enlargement of the generating plant of the Manila Electric Company in the capital of the Philippine Islands is about to be made by the addition of a 12,500-kw. Allis-Chalmers steam turbo-generator to the equipment already installed. The latter consists of two 2,000-kw., two 2,500-kw. and two 5,000-kw. units, and energy is transmitted at 3,400 volts, two-phase. The new generator will operate at 13,800 volts, three-phase, and four transmission lines at that tension will carry energy to six substations. All the equipment of the Manila central station is 60-cycle. Part of the load is delivered to the street railway company.

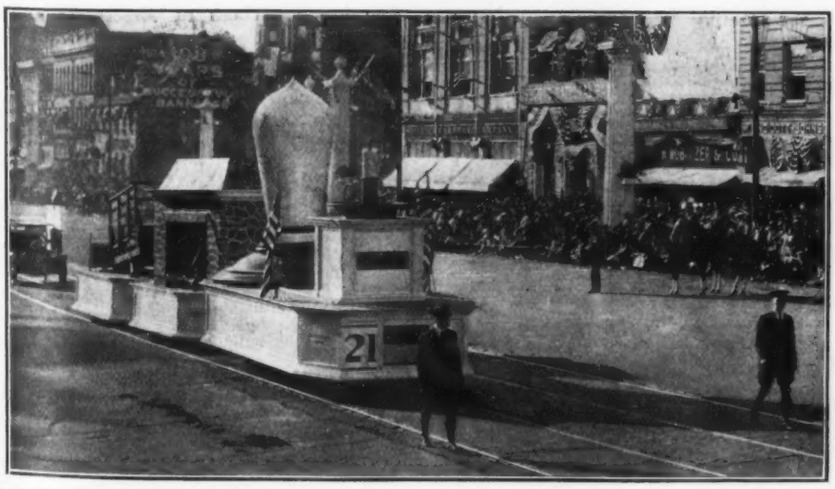
The new equipment will be the initial installation in a power house which is ultimately to contain four such units. As they are installed the old plant will gradually be abandoned. There will be a steam pressure of 325 lb., temperature 650 deg. Switchboard and switching equipment has been ordered from the Westinghouse Electric & Manufacturing Company. The J. G. White Engineering Corporation is in control of the work.

Rome (N. Y.) Gas & Electric Changes Hands

Interests owning the Northern New York Utilities, Inc., and the Power Corporation of New York have purchased the entire common stock of the Rome Gas & Electric Company, according to an announcement by F. L. Carlisle & Company, Inc. Application will be made shortly to the Public Service Commission for permission to merge the purchased company with the New York Utilities.

The Rome company, which furnishes electricity and gas in the city of Rome, N. Y., was purchased from the National Gas, Electric Light & Power Company of Philadelphia. The output of the combined companies will, it is announced, exceed 250,000,000 kw.-hr. a year. The Northern New York Utilities, Inc., and the Power Corporation of New York control a large portion of the inland water-power resources of New York State. The former deals chiefly in light and power for domestic use; the latter sells water power wholesale to public utility companies.

Candle Versus Electric Light



DURING the celebration of the one hundred and seventy-fifth anniversary of the founding of Reading, Pa., the Metropolitan Edison Company showed the tremendous advance electric light and power have made over the candlelight and horsepower of those early days by means of a very attractive float, one of the conspicuous features in a city parade.

Brief News Notes

Cambridge City Municipal Plant Sold Again.—The Indiana Public Service Commission has authorized the Cambridge Light & Power Company of Cambridge City to buy the Cambridge City municipal electric plant and system, which was purchased by Robert S. Ashe some time ago.

Union Gas & Electric May Buy Hamilton Municipal Plant.—The Cincinnati Union Gas & Electric Company is negotiating for the purchase of the Hamilton (Ohio) municipal electric plant. The purchase price has been set at $500,000, it is indicated. Purchase of the municipal plant would give the Union Gas & Electric Company an exclusive light and heat franchise in Hamilton.

Federal Power Commission Expenses Less Last Year than Year Previous.—The Federal Power Commission expended less money during the last fiscal year than during the fiscal year which preceded it. The total cost of administering the act during the fiscal year 1922-1923 was $134,000. This is $20,000 less than the total expenditures of the preceding fiscal year. Eighteen per cent of the total is represented by the amounts paid out of departmental appropriations for salaries of the employees loaned to the commission.

Southern Edison Pushing Work on Florence Lake Tunnel.—Work on the Florence Lake tunnel beneath the Kaiser hills, in the High Sierras, is being pushed by the Southern California Edison Company. This work began in 1912. When it is finished the waters of Florence Lake will be poured into Huntington Lake, 14 miles distant through the mountain, and, according to estimates, enough additional electrical energy to supply a million domestic consumers will be available. All of this, company officials say, will

be needed in from five to seven years. The tunnel will be more than twice as long as the Rogers Pass Tunnel on the Canadian Pacific Railway, which is at present the longest on the American continent, and more than a mile longer than the Simplon Tunnel through the Alps in Switzerland—now the world's longest. The construction camps on Lake Florence can be reached in the winter only by dog sledge.

Beck Has "Retaliation" Plan.—That Ontario should retaliate for the diversion of Great Lakes water through the Chicago Drainage Canal by appropriating for herself more water at Niagara Falls was suggested in an address the other day by Sir Adam Beck, chairman of the Ontario Hydro-Electric Power Commission. "If they insist on being pirates," he said, "they cannot object to our being bandits, and when we find we are short at Niagara through the diversion at Chicago may we not assume we can also take an extra 12,000 or 14,000 feet a second? Why should we go on starving our canal? That would be one method of doing business."

Uncle Sam's Electric Dredges.—The United States Engineer Corps' new sea-going dredge, the *A. Mackenzie*, uses electricity for every possible purpose, from propelling the ship to blowing the whistle. She is the largest vessel to use the Diesel-electric drive. She and three sister ships which are rapidly nearing completion at the yards of the Sun Shipbuilding Company, Chester, Pa., will be used to keep the channels of the harbors open and are expected to decrease greatly the cost of this operation. All of her electrical equipment was supplied by the Westinghouse Electric & Manufacturing Company.

Nova Scotia Commission Makes Contract to Supply Canadian Plant of Albany Company. — The Nova Scotia Power Commission has recently signed a contract with the Albany (N. Y.) Perforated Wrapping Paper Company to furnish it with 4,600 hp. of electrical energy at West River, Sheet Harbor, N. S., for its Canadian plant. The price for this power delivered at 2,300 volts is about $21.30 per horsepower-year. For the purpose of furnishing this power the commission will erect a second generating station on East River, Sheet Harbor. This station will operate at a head of about 100 ft. and will have an ultimate capacity of about 9,000 hp. It will be erected at Tidewater, about 4 miles below the development at Malay Falls on the same river which the commission is just now completing.

Consolidated Gas, Electric Light & Power Changing Frequency.—The Consolidated Gas, Electric Light & Power Company of Baltimore has ordered from the Westinghouse Electric & Manufacturing Company two 9,000-amp., 469-r.p.m., six-phase, 62½-cycle booster converters; two 3,075-kva., 55-deg. oil-insulated, self-cooled indoor transformers and two sets of switching equipment for use on the high-voltage side of the transformers. The transformers are for three-phase, 62½ cycles, with 13,200 volts at high tension and 250 volts and 275 volts direct current at low tension. The converters are to be started by the star-delta method. This is the first substation apparatus of this frequency purchased by the Baltimore company. Future expansion will be made on the basis of 62½ cycles.

Wisconsin Utility to Build 5,600-Hp. Hydro Plant. — The Wisconsin Valley Electric Company is about to start construction of a dam and power plant in the Wisconsin River about 3 miles above Merrill, Lincoln County, at a site known as Rocky Carry or Upper Merrill. This dam will have a head of approximately 23 ft., and the power plant will be designed for a capacity of 5,600 hp. Bids are now out for quotations on waterwheels and generators. The construction work will be done by the company's engineering department, and the power plant has been designed by L. A. De Guere, Wisconsin Rapids. This will be the fifth hydro-electric plant controlled by the Wisconsin Valley Electric Company. The company has four undeveloped water-power sites, of which Rocky Carry is the smallest. When completed the energy generated will be fed into the high-tension transmission system supplying Tomahawk, Merrill, Wausau, Mosinee and Stevens Point.

Ithaca Central-Station Company May Absorb Six Others.—Six public lighting companies serving small communities in central and southern New York have made application to the Public Service Commission for consent to the transfer of their franchises and other property to the New York State Gas & Electric Corporation of Ithaca. These companies are the Madison Power Company of Oriskany Falls, the Waterville Gas & Electric Company, the West Branch Light & Power Company of Stamford, the Delaware County Electric Light & Power Company of Delhi, the Fleischmanns Light, Heat & Power Company and the Moravia Electric Light & Power Company.

Rotterdam Substation Nearly Completed.—The new Rotterdam (N. Y.) substation of the Adirondack Power & Light Corporation, which is to be a central dispatching point for all the energy generated by that company, will, it is officially announced, be in full operation in a week or two and will then rank with the large power centers of the country. The company also announces the beginning of work on the erection of a 66,000-volt power line, extending from Glens Falls to Spier Falls, 11 miles. The new line will carry 60-cycle energy, in keeping with the corporation's plan of standardization, and will furnish energy for the Glens Falls Portland Cement Company and the Moreau Manufacturing Company, which last firm is developing the Feeder Dam project near Glens Falls.

Consolidation of New Hampshire Utilities Planned.—The New Hampshire Power Company, 70 State Street, Boston, has petitioned the New Hampshire Public Service Commission for authority to purchase the Newport Electric Light Company, Sunapee Electric Light & Power Company, Contoocook Electric Light Company, Antrim-Bennington Electric Light & Power Company, Canaan-Enfield Electric Company, Hillsboro Electric Light Company and Lake Sunapee Power Company. To effect the purchase the New Hampshire Power Company is seeking permission to issue bonds and preferred stock to the amount of $1,200,000.

Associations and Societies

Wisconsin State Association of Electrical Contractors and Dealers.—This association will hold its annual convention at the Pfister Hotel, Milwaukee, on Jan. 17-19, 1924.

Tennessee Contractors Meet. — The twelfth annual convention of the Tennessee Association of Electragists and the Central South District Association of Electragists International was largely attended at the Hotel Gayoso, Memphis, on Nov. 12 and 13. President E. R. Wright of Memphis was in the chair, and James R. Strong, New York, president of the parent body, spoke. L. W. Davis of New York, Col. Robley S. Stearnes of New Orleans, A. F. Anderson of Nashville, O. C. Small of New York, L. C. Datz of Memphis and J. A. Fowler of Memphis made addresses, and a "get together" luncheon was given by the Memphis Electric League and a dinner by the Wesco Supply Company.

Coming Meetings of Electrical and Other Technical Societies

[A complete directory of electrical associations is published in the first issue of each volume. See July 7 issue, page 56, for latest list.]

American Physical Society—Ryerson Physical Laboratory, Chicago, Nov. 30-Dec. 1. H. W. Webb, Columbia University, New York.

American Society of Mechanical Engineers—New York City, Dec. 3-6. C. W. Rice, 29 West 39th St., New York.

National Association of Railway and Utilities Commissioners—Hotel Urmey, Miami, Fla., Dec. 4-7. J. B. Walker, New York Transit Commission, New York City.

Accounting National Section, N. E. L. A.—Hotel Muehlenbach, Kansas City, Dec. 10-11.

American Engineering Council (F. A. E. S.)—Washington, Jan. 10-11. L. W. Wallace, 26 Jackson Place, Washington.

Wisconsin State Association of Electrical Contractors and Dealers—Pfister Hotel, Milwaukee, Jan. 17-19. H. M. Northrup, 23 Erie Street, Milwaukee.

Western Association of Electrical Inspectors—Hotel Fontenelle, Omaha, Jan. 29-31. W. S. Boyd, 175 West Jackson Blvd., Chicago.

American Institute of Electrical Engineers—Midwinter convention, Philadelphia, Feb. 4-8. F. L. Hutchinson, 33 West 39th St., New York.

Commission Rulings

Unprofitable Plant Cannot Be Treated as Obsolete.—In an investigation of interurban railway rates charged by the Detroit United Railway the Michigan Public Utilities Commission said that plants in actual operation and supplying power for interurban railway operation cannot be treated as obsolete and substantially worthless, although their useful life may be about over and they are no longer economically profitable in operation, because of the possibility of purchasing power at a lower cost, since the commission cannot compel the company to contract to purchase power.

Principle Governing Extension Not Immediately Remunerative.—Ordering the North Coast Power Company to extend service to the city of Banks, which is in the company's territory and has no alternative source of supply, but to serve which involves building about 8 miles of line, the Public Service Commission of Oregon said: "As a general rule where a utility has voluntarily entered a field, as the North Coast Power Company has done, and has undertaken to serve that field, it must render adequate service, which naturally involves the furnishing of all reasonably adequate facilities. It is not necessary that the delivery of service to a new community immediately produce a full return. It should, except in extraordinary cases, hold out the prospect of not becoming a permanent burden upon the other users of the utility's service."

Good Service Depends on Proper Rates.—In recent rate proceedings affecting the Potomac Electric Power Company the Public Utilities Commission of the District of Columbia observed: "What is desired by all is good service, and this implies dependability as well as reasonable rates. To insure dependability, and for the business man particularly this is the first consideration, it is necessary that the company shall always be in a position to keep the capacity of its plant well in advance of the demand upon it. To insure economy in generating energy it is necessary that the company shall keep well abreast of progress in the mechanical and electrical arts, installing new and improved appliances promptly when their worth has been demonstrated. To do these things the company must be able to raise funds in comparatively large amounts. To enable this money to be secured at reasonable rates, if at all, requires that the company shall have good credit. It is therefore in the interest of the entire public that rates be not reduced so low as to prevent that healthy growth of the company's facilities without which the entire community might suffer serious losses and inconveniences of various kinds."

Failure to Serve Because of Lack of Co-operation and Insufficient Canvassing.—Asserting that from its own investigations and the evidence offered at the hearing it appeared that up to that time the co-operation between the Portland Railway, Light & Power Company and residents of an outlying district who complained that service had been refused them had not been conducive to a proper understanding of the rules, regulations and practices prescribed by the commission in the construction of service lines by public utility companies operating in Oregon, and that the evidence showed that the defendant company failed thoroughly to canvass the district, and as a result many of the residents along the proposed route were not fully advised as to the conditions under which electric service would be supplied by defendant company, the Public Service Commission of Oregon ordered that the desired service be extended under the rules of the commission.

Recent Court Decisions

St. Petersburg, Fla., Enjoined Against Competing with Existing Central-Station Company.—The court of the Sixth Judicial Circuit, Florida, has refused to dissolve an injunction obtained by the Pinellas County Power Company against the city of St. Petersburg forbidding it to do a general electricity supply business in competition with the company, which has a long-established plant there. The city, after supplying electrical energy from its plant to all the municipal departments requiring it, began to connect up private consumers and had five such connections made when the injunction was obtained. The court pointed to a statute which provides that before rendering private service a municipality must, if there exists a utility company in the same business, offer a fair value for the private company's plant, to be fixed by arbitration if the parties cannot agree, and then purchase the property at the price determined. The company has the right to refuse to sell, and in that event only can the city enter into competition with it.

Wisconsin Commission Wins Suit Involving Its Right to Impose Very Large Fines.—A decision with far-reaching implications has been handed down by the Wisconsin Supreme Court in favor of the Wisconsin Railroad Commission against the Washburn Water Works Company of Washburn. In 1918 the commission ordered the company to make certain extensions to its water mains following requests from city officials and property owners. Owing to the high cost of material and the scarcity of labor during the war the company claimed that it was unable to comply with the commission's order and did not put in the mains until later, the commission in the meantime assessing fines against the company aggregating close to a million dollars. When the case was tried in the lower court at Madison the court held that the commission had exceeded its jurisdiction, and the commission appealed. When the case was called for trial before the Supreme Court representatives of the water company failed to appear, and as a result the court handed down a decision sustaining the original decision of the commission and holding the company liable in the amount of the accumulated fines.

Superior (Wis.) Suit Decided in Favor of Company by Highest Court.—The United States Supreme Court appears to have dealt a blow to the Wisconsin public utilities act of 1907 in a decision rendered Nov. 12 in the suit of the Superior Water, Light & Power Company against the city of Superior. This suit was in opposition to the efforts of the city to acquire by condemnation proceedings the electric, gas and waterworks branches of the company's business. (See ELECTRICAL WORLD, March 31, page 766; Sept. 1, page 452, and Sept. 8, page 506.) The Supreme Court, in reversing the decision of the Wisconsin Supreme Court, which had held for the municipality, declared in effect that the Legislature is without authority to invalidate contracts between public utility corporations and political subdivisions. The predecessor of the Superior Water, Light & Power Company had obtained a franchise from the city of Superior to supply water throughout the municipality for thirty years. Subsequently this franchise was amended by mutual agreement to provide that at the expiration of the thirty years it would be extended by the city for twenty-five years or the city should purchase the plant on a fixed basis of payment rated according to income. After this amendment the water company made extensive improvements and extensions. The Wisconsin public utility act of 1907 provided that utility franchises should be indeterminate. The Superior Water, Light & Power Company did not submit to this act. Subsequently an amendment by the Legislature made the indeterminate franchise mandatory. When the franchise expired the company called upon the city for an extension or for purchase of the plant according to the terms of the franchise. The city refused, relying upon the state act, and started condemnation proceedings to acquire the plant by terms other than those in the franchise. The company resisted in the courts. In upholding the contentions of the company the Supreme Court asserted that the franchise and its amendment constituted a valid contract, not subject to abrogation by the state public utilities act.

Men of the Industry

Changes in Personnel
Accomplishments, Responsibilities, Honors, Appointments and Activities of Men Engaged in all Branches of the Electrical Industry

C. N. Stannard Elected General Manager of Merger Company

Clare N. Stannard, vice-president and general manager of the old Denver Gas & Electric Light Company, has been elected first vice-president and general manager of the Public Service Company of Colorado, which was formed recently through the merger of the Denver Gas & Electric Light Company and the Western Light & Power Company. Mr. Stannard, who entered the public utility field in 1891, has been associated twenty-five years with the Denver Gas & Electric Light Company and its predecessor, the Denver Consolidated Electric Company, during which period he advanced steadily from a position in the auditing and cashier's department to the office of vice-president and general manager. He is a native of New York State and before going West spent several years with public utility companies in the East and South.

Charles A. Semrad, Boulder, vice-president and general manager of the Western Light & Power Company, has been elected second vice-president and assistant general manager of the new organization.

H. A. Douglas is now manager of the Lancaster (S. C.) Light & Power Company, succeeding J. W. Hendrick.

H. J. Hunsicker has been made chief engineer of the Adirondack Power & Light Corporation, Amsterdam, N. Y., having general charge of civil, electrical and hydraulic engineering.

W. N. Meeker has been promoted to superintendent of District No. 3 for the Indiana Power Company, with headquarters at Dugger, Ind., replacing H. W. Mayfield, who has been transferred to the general office of the company.

Eugene Lyford has become superintendent of transmission lines of the Adirondack Power & Light Corporation, Schenectady, N. Y. Mr. Lyford's appointment lessens the duties of the various resident managers in connection with the proper maintenance of transmission lines.

T. L. Bissell, formerly manager for the Westinghouse Electric & Manufacturing Company at Birmingham, Ala., has been made assistant commercial manager of the Alabama Power Company. Mr. Bissell went to Birmingham in 1916 as sales engineer for the Westinghouse company and for the past three years has been the Birmingham manager in charge of sales work.

Arthur P. Davis, the past-president of the American Society of Civil Engineers, whose dismissal as Director of the Reclamation Service by Secretary Work caused many protests from engineering and other bodies, has been elected to honorary membership by the Washington Society of Engineers. This honor has been conferred on only four others. Mr. Davis is now in England, representing the Department of State on engineering matters coming before the Pecuniary Claims Commission.

Dr. Russell, President of the I. E. E.

Dr. Alexander Russell, president of the Institution of Electrical Engineers, has been associated with the Faraday House Electrical Engineering College, London, since 1890, the year of its establishment, when he became senior lecturer and head of the physical laboratory. In 1909 he became principal of the college, and he is occupying that office at the present time. Dr. Russell was born at Ayr, Scotland, in 1861 and was educated at Glasgow University, from which institution he received M. A. and D. Sc. degrees. He then went to Cambridge. Before identifying himself with Faraday House he spent two years as an assistant lecturer at Caius College and a short time as a mathematical master at Cheltenham College and at the Oxford Military College.

DR. ALEXANDER RUSSELL

Dr. Russell has devoted considerable time to research work in physics and electrical engineering, the results of which he has contributed to the scientific and technical press. His advanced treatise on alternating current, published in 1904, was translated into French. Dr. Russell has served for many years on the council of the Institution of Electrical Engineers and has also been active on the council of the Physical Society of London, of which he is a past-president.

A. R. Small, a vice-president of Underwriters' Laboratories, was elected first vice-president of the organization at a meeting of the board of directors on Nov. 10.

H. W. Mayfield, superintendent of District No. 3 for the Indiana Power Company, with headquarters at Dugger, Ind., has been transferred to the company's general office at Vincennes as distribution engineer.

W. H. Hodge, advertising and publicity manager of the Byllesby Engineering & Management Corporation, is on a business trip in the Far West. He expects to return shortly after Thanksgiving.

Dr. Douglas W. Johnson, professor of physiography at Columbia University since 1901, has been appointed exchange engineering professor to France. Dr. Johnson, who is internationally known as educator, author and scientist, will represent for the next academic year seven institutions—Cornell, Harvard, Johns Hopkins, Massachusetts Institute of Technology, University of Pennsylvania, Yale, Columbia—with which the National Department of Public Instruction in France has established exchange relations in engineering and applied science.

George E. Jaquet, who edited the "Electrical Directory of Canada" for 1923, is now a member of the staff of the Society for Electrical Development. After being graduated as an electrical engineer from the University of Illinois, Mr. Jaquet joined the forces of the New York Central & Hudson River Railroad. Subsequently he was with the General Electric Company and the Shawinigan Water & Power Company, Ltd. Recently Mr. Jaquet has been manager of Philadelphia's first electric home, under the auspices of the society.

Maxwell V. Sauer, formerly hydraulic engineer of design of the Hydro-Electric Power Commission of Ontario, has resigned to become hydraulic engineer of Canadian Vickers, Ltd. Mr. Sauer's headquarters will be in Toronto, but he will also be consulting engineer to Vickers, Ltd., of England, in connection with hydro-electric developments in several foreign countries. During the past five years he has had charge of the design of the hydraulic features of the Queenston, Nipigon, Ranney's Falls and High Falls plants and in addition has made numerous reports on the power possibilities of various sites now undeveloped throughout Ontario, including those on the St. Lawrence River.

Frank E. Watts has joined the organization of the Apex Electrical Distributing Company, Cleveland, in the capacity of director of distribution and publicity. For the past three and a half years Mr. Watts has been identified with the Gage Publishing Company of New York, first as assistant to the president and later as editor of the *Electrical Record* and editorial director of the Spanish publication *Electricidad en America*. He has for ten years made a special study of the economics of distribution.

M. P. Rice Heads G. E. Publicity Department

Martin P. Rice, who was recently made publicity manager of the General Electric Company, as was announced in the Nov. 17 issue of the ELECTRICAL WORLD, entered the service of the company in 1895 and was first employed in the drafting room. After nine months he was transferred to the engineering department, and when the X-ray was discovered he was assigned to that new work. When the publication bureau was organized in December, 1897, he was made manager, a position he has held since that time. In this capacity he had supervision of all company printing, photographs, technical data and general publicity. In June, 1903, he established the *General Electric Review* as an internal publication, but today it is considered one of the important technical magazines of the country. In February, 1921, when the General Electric Company became interested in radio broadcasting, Mr. Rice was made director of radio broadcasting, and in this position he outlined the company's policy in this new field.

F. M. Kollock has resigned as treasurer of the Westinghouse International Company and will leave for Australia about Dec. 1 to look after Westinghouse interests in that country.

Thomas B. Card, formerly assistant superintendent of distribution of the Dayton (Ohio) Power & Light Company, is now connected with Stone & Webster, Inc., as assistant engineer.

John B. O'Connell, formerly engaged in design work for the Pennsylvania Railroad, is now associated with the Public Service Company of Northern Illinois.

R. M. Edwards, superintendent of the Poteau district of the Oklahoma Gas & Electric Company, has been transferred to Shawnee, Okla., as superintendent. E. Spillers has succeeded Mr. Edwards at Poteau.

William E. Rogers, formerly manager of the municipal electric light plant, Leesburg, Fla., is now power sales engineer with the Pennsylvania Power & Light Company at Wilkes-Barre, Pa.

James F. Muir, formerly mechanical engineer for Toltz, King & Day, Inc., St. Paul, has become associated with Stone & Webster, Inc., as engineer in the mechanical division, with headquarters at Boston.

R. C. Rice, district engineer in Arizona for the United States Geological Survey, has resigned to enter the employ of the Southern California Edison Company. W. E. Dickinson of Salt Lake City will succeed Mr. Rice in the Geological Survey position.

Walter S. Gifford was elected executive vice-president of the American Telephone & Telegraph Company at a recent meeting of the board of directors. Mr. Gifford has been associated with the company since 1908, when he became its chief statistician. During the war he obtained a leave of absence to serve as director of the Council of National Defense and upon his return following the war was appointed comptroller of the company. A year later he was made a vice-president in charge of financing and accounting, and for the last two years in addition to these duties he has done executive work for the headquarters organization.

John M. Fernald, for the past four years on the sales engineering staff of the Cutler-Hammer Manufacturing Company, with headquarters at Boston, has been appointed general sales representative of the S. A. Woods Machine Company, South Boston motor division. Mr. Fernald succeeds the late M. J. Fitch in the Woods sales organization.

E. M. Herr the New President of Electrical Manufacturers' Club

Edwin M. Herr, president of the Westinghouse Electric & Manufacturing Company, was elected president of the Electrical Manufacturers' Club on Nov. 14 at Hot Springs, Va. Mr. Herr has been chief executive of the Westinghouse company since 1911, and for six years previous to that he was its first vice-president. When he first entered the electrical industry he engaged in railroad work, but he abandoned this field in 1898 to become assistant general manager of the Westinghouse Air Brake Company. A year later he was promoted to the office of general manager, which position he occupied until his election to the vice-presidency of the Westinghouse company. Mr. Herr is a native of Lancaster, Pa., and a graduate in mechanical engineering of the Sheffield Scientific School of Yale University. In addition to being president of the Westinghouse Electric & Manufacturing Company, Mr. Herr is president of the Westinghouse Lamp Company and vice-president of the Bryant Electric Company, the Perkins Electric Company, Bridgeport, Conn., and the R. D. Nuttall Company, Pittsburgh. He is a member of the A. I. E. E., the A. S. M. E. and the American Civic Federation.

E. M. HERR

Obituary

William F. Brewster, a founder-member of the Edison Pioneers, died on Nov. 9. Mr. Brewster, who was one of the earliest pioneers of the central-station industry, attended Engel's Academy, Port Huron, Mich., when Thomas A. Edison was a student there, and later he was associated with Mr. Edison in the marketing of the electric light. Mr. Brewster went to Chicago about the time of the World's Fair and has since been identified with the Commonwealth Edison Company.

H. H. Hermes, formerly commercial manager of the Oklahoma Gas & Electric Company, died on Nov. 4 in Independence, Kan. Mr. Hermes was well known in Oklahoma City when he was commercial manager, about five years ago.

William D. Packard, a member of the pioneer firm manufacturing "Packard lights," died at his home in Warren, Ohio, Nov. 11 after an illness of several years. Mr. Packard was widely known in electrical circles in Warren through his activities in bulb manufacture. He and his brother, J. W. Packard, were the founders of the Packard Motor Company about twenty-five years ago. Mr. Packard was sixty-two years of age.

William G. Bligh, a retired executive engineer of the Indian Public Works Department, died recently in Calgary, Alberta, at the age of seventy-seven. Mr. Bligh was born at Great Malvern, England, but lived in India for a number of years in the employ of the Public Works Department. He designed and constructed some of the largest irrigation work in Burma and other provinces of India.

Raymond J. Miller, well-known electrical engineer of Atlanta, and for the past two years head of the R. J. Miller Electric Company, died recently at his home in that city at the age of thirty-seven. From 1913 to 1919 Mr. Miller was connected in an executive capacity with the repair department of the General Electric Company, Atlanta branch, and during the latter year he went to New Orleans to enter the electrical business for himself. He remained there for a short time, then returned to Atlanta and organized the R. J. Miller Electric Company.

John E. Moore, power-plant specialist and electrical engineer in charge of plant methods of the Western Electric Company at Chicago, recently died. Mr. Moore had been with the company since 1908 and was largely responsible for the conversion of the power plant and distributing system from direct current to alternating current, the development of a complete line of panel boxes and a power-loop distributing system in connection therewith, and also the development of special applications to many types of machinery of multi-speed alternating-current motors with controlling apparatus. Mr. Moore was a graduate of Purdue and had been a professor of electrical engineering at Princeton.

Manufacturing and Markets

Devoted to the Discussion of Business and Economic Problems of the Producer and Distributor, with Market Reports, Trade Activities, Foreign and Construction News

A Survey of the Business Outlook*

A Balance of the Favorable Against the Unfavorable Conditions in the Prospect Before the Electrical Industry Gives Encouragement

By Frederick P. Vose
General Secretary National Electrical Credit Association

A REVIEW of the credit and collection conditions of the country generally and in the industry specifically shows that the business situation is satisfactory to the conservatives. It is not so satisfactory to those of speculative proclivities. Last spring the optimistic outlook ran away with sound judgment. Then business received a setback because of ill-reasoned rumors that foretold panic or serious trade depression. Neither materialized, for there was no sensible ground for either.

F. P. Vose

Favorable Factors

There is now recognized a conservative but encouraging reaction predicated upon the following grounds:

1. The people are generally employed. All who desire to work are busy.
2. The savings deposits are greater than ever before.
3. The Federal Reserve system has proved its worth as a stabilizer of credits.
4. Railroads are making satisfactory headway financially and are operating at high efficiency. They are placing large orders for equipment and supplies for present and future deliveries. Top-notch records of car loadings indicate wide distribution and consumption.
5. Farm products, while lower in proportion to manufactured products, are in line for a substantial increase. The farmers are receiving better prices than last year.
6. Mail-order houses report increased volume of business, proving enhanced buying power on the part of rural communities, which represent over 45 per cent of our total population.
7. Further stimulus to general business is expected to result from the efforts of leaders of the building trades to keep construction going through the winter to make it an all-year-around industry.
8. The country is becoming so solid in its business structure that in spite of the unsettled conditions of Europe we may comfortably look forward to a period of measurable prosperity.

The chain-store systems are showing substantial gains. This is also true of the department-store trade. These, together with mail-order houses, reflect perhaps as accurately and as adequately as any other sources the ability of the buying public generally to purchase and pay for their requirements.

The building records of recent months are being more than sustained generally. Much new work is being projected. Architects and contractors generally agree that there is a large body of construction in hand and in sight. The permit statistics from 262 principal cities reveal a gain of 32 per cent over building in October, 1922.

The foreign trade situation is remarkably encouraging. The October record published by the Department of Commerce on Nov. 13 shows outgoing merchandise of a value of $402,000,000. This is the first time since February, 1921, that exports have exceeded the four-hundred million mark. They have increased both in volume and value over last year.

The total exports for the last ten months were over $222,000,000 greater than in the corresponding months of last year. Our exports to Latin America have increased 33⅓ per cent over 1922.

While merchandise imports also show enlarged volume, the trade balance favorable to this country for October amounted to nearly $100,000,000. For the ten months of 1923 the net imports of gold were in excess of $223,000,000, compared with $199,687,000 for the corresponding period last year.

Unfavorable Factors

One of the recognized barometers of business pointing toward a pause in the expansion of trade is the decrease of unfilled orders reported by the United States Steel Corporation for October, showing 363,000 tons less than in September and leaving the total of unfilled contracts the smallest since March, 1922. Some assume from this that business is headed toward contraction. However, the statistical trend does not square closely enough with the characteristics of a liquidation period to warrant the assumption that business depression has begun or is imminent.

It is significant that the general level of commodity prices is firmer. Prices are neither sky-rocketing nor plunging headlong. The general level is stabilizing.

Has your attention been called to the recent significant statement by Sir Arthur Balfour? He is a manufacturer in Sheffield, England, president of the Associated Chamber of Commerce of Great Britain and personally a leading figure in British industry. Sir Arthur has been in the United States and has made a very careful present survey of this country. On his return home he gave utterance to expressions like this—that he would not exchange England's position for America's today; that he regarded the financial

*An address before the winter meeting of the Electrical Supply Jobbers' Association, Buffalo, Nov. 15, 1923.

and economic situation in Britain as fundamentally much stronger than that in this country. He said:

> The cost of living and the cost of production in America is so high that I am perfectly certain that, except in a few selected articles, we can compete with her for the export trade of the world. The Americans have just passed through a slight slump, but I think they are likely to have a fair internal trade for the next eighteen months. After that I think they will go through three or four depressed years, which will be the only method of re-establishing the economic situation and getting them back to a competitive basis. At present the wages being paid are so high that building is much restricted and rents are impossible.
>
> America is depending very much upon the sale of her wheat crop and her cotton crop in Europe and has only just begun to realize that other parts of the world are in a position to supply the necessary wheat to England for instance, and that in view of the Fordney tariff and the manner in which it is restricting trade with them, England is naturally compelled to buy her foodstuffs in markets where she can create a favorable exchange by trading.

You may have noticed also that when the American Bankers' Association held its last convention, in August or September, its speakers re-echoed the sentiment expressed by Sir Arthur Balfour. It was the sane counsel of the bankers of this country which checked that forward, foolish rush this spring. They knew from their past experience that this country could not stand another period of inflation following so soon on the heels of the previous one.

The spirit of aggressive confidence that was lost last spring has not been regained. Psychology is playing a large part. The effect of the action of the public mind is the same whether the thinking is well ordered or not. The state of business is largely, therefore, the condition of confidence in the minds of the people. One of the elements entering into reactionary thinking which tend to repress enterprise is that the industrial dollar is still sadly out of balance with the agricultural dollar. The policy of labor organizations in forcing wages upward and refusing to make concessions is a serious handicap. The basis of all just compensation is service. Values must be created to sustain every wage paid. There is still being manifested in some of the industries concerted action aimed to cut down working hours but to maintain the wage. Thus the cost of living is being increased by the high wages being paid to those engaged in essential industries. These, in turn, react and create a vicious circle detrimental to all.

These are, roughly and crudely, only some of the elements that have entered into and affected adversely the common mind, leading many to fear that at almost any moment reaction may take place. This may account, in part, for the cautious buying from hand to mouth that has characterized not a few lines throughout the country.

So much for an acknowledged incomplete survey, pro and con, of conditions generally. Happily, on the whole, they may be summed up as distinctly encouraging. I am delighted to be able to say just that, for on two prior occasions in speaking before this body, in 1920 and 1921, I have been rated as a pessimist. Today I am sanely optimistic with respect to the body social and economic.

CREDIT IN THE TRADE

Now, specifically, on a questionnaire that was sent out to a number of electrical jobbers and manufacturers in a widespread number of cities, the first question asked was: "Are your sales for the first ten months of this year greater than for the corresponding months of 1921-22?" The answer among jobbers was ten to one in favor of greater sales. The answer among manufacturers was eight to one in favor of greater sales.

The second question was: "Are you encountering difficulties in collecting your outstanding receivables?" The jobbers' answers were equally divided between encountering greater difficulties and average difficulties. The manufacturers' replies indicated slightly greater difficulties encountered in collections, especially during September, than are averaged normally, and yet in reply to question 3, "Are you encountering greater difficulties than in 1921-22?" the answer was about three to one "No."

On question 4, "What percentage of your outstanding receivables are you compelled to watch and follow closely?" the spread among the jobbers was from 2 to 25 per cent. Among the manufacturers the average ran from 10 to 15 per cent.

On question 5, "What percentage of your outstanding receivables do you report to the E. C. A.?" the replies indicated from 1 to 15 per cent, averaging less than 5 per cent.

On question 6, "What percentage of those reported to the E. C. A. are adjusted by the use of the forms?" the jobbers' record showed a spread of from 30 to 80 per cent, the average being 58 per cent. Among manufacturers the spread was from 33⅓ to 90 per cent, averaging 67 per cent.

In response to question 7, "What percentage of your outstanding receivables do you turn over to attorneys for collection?" the majority of jobbers reported less than 1 per cent. Forty-odd per cent reported from 1 to 3½ per cent. The majority of manufacturers turned over to attorneys less than 1 per cent, whereas those reporting from 1 to 2½ per cent placed with attorneys were about one-third of those reporting less than 1 per cent, and those reporting from 3 to 5 per cent placed with attorneys were likewise about one-third of the number reporting less than 1 per cent.

The amount collected by attorneys averaged among the jobbers 54 per cent, whereas the manufacturers reported 68 per cent, showing apparently greater credit risks being taken and losses suffered by jobbers. The average percentage of losses through bad accounts among the jobbers was seven-tenths of 1 per cent for the years 1921, 1922 and 1923, whereas the manufacturers reported three-tenths, plus, of 1 per cent. Some manufacturers reported much higher losses in 1922 growing out of the depression of 1920-21.

N. E. C. A. RECORD

In the New England territory the claims reported July, August, September and October, 1923, showed a falling off in number as compared with the corresponding months of 1922 and a slight falling off in the average amount of dollars per claim reported.

In the New York territory the number averaged less, but the amounts averaged slightly more. In the Middle and Southern Atlantic States the number of claims was less and the average amount involved was less. In the Central Division the average number was slightly less (with the exception of the month of October, which showed a noticeable increase in number and amount), but the average amount was slightly increased during the last four months. On the Pacific Coast the average number was increased and the average amount was increased also.

On the whole, the number of slow and unsatisfactory accounts this

year shows the tendency to decrease in number, but with a recognized slight increase in the amount involved per claim. This points to the conclusion, which seems to be true, that credit men are more carefully scrutinizing their credit risks and are following more persistently their collections.

In the country collection department of a law office which has specialized for more than a quarter of a century in handling collections for the electrical jobbers and manufacturers the record for the first ten months in 1921 was 244 per cent, as compared with 1919. It was 311 per cent in 1922 as compared with 1919 and 267 per cent for the first ten months this year as compared with 1919, substantially the same number of clients utilizing the service. This would indicate a falling off in number of claims as compared with last year and but a slight increase of the claims this year as compared with the year 1921. The sums collected show an increase over last year.

Commercial failures in the United States for the first ten months this year totaled 15,173, as against 20,125 for the corresponding months of 1922 and 15,220 for 1921.

While the amount of liabilities involved in the reported failures of October, 1923, was $79,301,741, and this has only been exceeded by the month of December, 1921, a separation of the failures of exceptional size shows that five insolvencies alone supplied more than one-half the October liabilities. The number involved for October was 1,673, which is less than in the corresponding month of 1921 and 1922.

From the foregoing statistical review it clearly appears that the records are in complete harmony and consistent with the general underlying business conditions throughout the country, all pointing to a sanely encouraging outlook. All the electrical jobbers and manufacturers who have freshly in mind the losses incurred in 1920 and 1921 through pyramiding and cancellation of orders and sharp deflations in prices will not speedily again place their necks in the noose which caught them then. And what is true of the electrical jobbers and manufacturers is true of the trade generally.

Reasonable conservatism should continue to characterize the market. All should take heart and face the future with full faith that prudent optimism is amply justified.

Business Conditions

A Survey of Important Developments in the Electrical Market Including Data on Production, the Sales Outlook, Credits, Exports, the Metals and Other Conditions Affecting Cost, Supply and Demand

NO MARKED change appears in the story of business conditions in important centers of electrical trade this week. Heating appliances, portable lamps and all devices suitable for Christmas gifts naturally hold the center of the stage with both retailer and jobber and will continue to move in increasing volume until the week of Christmas. In both the New York and Chicago territories there has been a falling off of central-station orders for equipment, but the rise in the price of copper has put more spirit in the wire market and there has been much gossip in the Middle West of an intended increase in the price of rubber-covered wire.

General business conditions in New England are good. The electrical business is improving there. Building continues strong in the Middle West. The industrial market on the Coast has been brisk. In the South the popularity of the electric range seems to be growing steadily, with increasing sales reported. The volume of radio business is steadily growing throughout the country, with every indication of a most successful season.

The proposal by the Secretary of the Treasury for reduction of federal income taxes has attracted a great deal of interest throughout the electrical industry, and another gain in export trade has added still further encouragement.

Recommendations on Lamp Cords and Appliance Plugs

FOR the purpose of reducing the stocks that must be carried by the electrical jobber throughout the country definite recommendations were made at the recent meeting of the Electrical Supply Jobbers' Association looking to the elimination of unnecessary styles of lamp cord and fixture wire. Manufacturers of portable lamps and lamp fixtures are requested to use only No. 18 new code $\frac{3}{32}$ approved types of cords, and the National Fire Protection Association was requested to co-operate with and indorse this recommendation. It was also recommended that manufacturers of heating appliances standardize on two types of heater cord, cord with two conductors individually braided and twisted and cord with two conductors individually braided, and that they be produced only in black color. It is also recommended that the varieties of silk and artificial silk cords be hereafter restricted to the following colors: white, brown, old gold, brush brass, maroon and olive green.

It was also reported at the jobbers' meeting that twelve of the manufacturers of heating devices have so far approved the recommendation made by the association some time ago that slow-moving and obsolete types of heating devices be eliminated from the manufacturers' catalogs. To assist in this work, the members of the heating devices committee are furnishing lists of types that are slow-moving and obsolete in their territories, recommending to the manufacturers that they be discontinued, or cataloged and listed separate from standard lines, so that distributors can eliminate handling the slow-moving types, if it is to their advantage to do so, and continue to handle standard types.

Ten manufacturers so far have agreed to conform to a standardization of the pins and plugs on the device ends of appliance cords, but there are a number of manufacturers who still refuse to do so, so that the establishment of any practical standard has not as yet been effected. The jobbers recommended at this meeting that the manufacturer give particular attention to bettering the quality of the plug at the device connection so that present troubles due to poor connections of the cord with the appliance may be relieved.

Simplification in the Fan Line Crystallizing, Jobbers Report

PROGRESS in the simplification of the electric fan line appears to be crystallizing. Reports from jobbers in various sections of the country indicate that discontinuance of production of the six-blade fan, in response to an almost complete cessation of demand, is now practically an accomplished fact. Of the more important manufacturers, seven no longer make or catalog the fan, and most of the remainder will adopt a similar course when present stocks of parts or completed product are exhausted.

Sentiment with reference to the abandonment of the non-oscillating fan is still divided, not only among manufacturers but among jobbers as well. There seems to be a preponderant opinion that the demand for the 16-in. non-oscillator has abated to a point where this type may safely be taken off the market, and several manufacturers have formally committed themselves to the action. Others prefer to continue observing the market, and this is almost unanimously the case with reference to the 12-in. non-oscillator. It seems to be general sentiment within the trade that by abandoning the production of non-oscillating types production costs of oscillators might be lowered, and it is pointed out that the manufacturers first taking advantage of this fact will find their strategic

positions in the industry vastly improved.

The reaction of the manufacturing branch of the industry to proposals that the ceiling fan be made more competitive in price with other types has not as yet been favorable. The demand for this type apparently does not afford the opportunity for quantity production necessary to place it on a level with comparable sizes of desk fans. Many jobbers and dealers feel, however, that if the fan could be brought within the reach of all those desiring it, the opportunity for quantity production would follow as a matter of course.

Heavy Duty Ranges and Heaters Active in New England

ELECTRIC heating equipment for hotel and bakery service is moving vigorously in New England, and the year's sales will undoubtedly close with a total considerably above 1922. Hotel ranges have been making fine records during the last year or two, and repeat orders are beginning to come in as evidence of purchasers' satisfaction. A new hotel under construction at Manchester, N. H., will be equipped with a large range as a direct result of satisfactory service by the controlling interests, which operate an "all-electric" hotel in Portland, Me.

Along the main automobile routes between the larger cities many food shops, tea rooms and restaurants have lately been equipped with electric cooking apparatus. In some cases sales have resulted directly from satisfactory experience by owners with domestic ranges in their homes before the building of these motor inns, and a liberal policy in regard to line extensions has been a factor in securing this class of business.

Rapid advances are being made in the design of all sorts of heavy-duty heating equipment, and in the bakery field many ovens have lately been installed in New England for pie and cake production, with other important installations for bread baking. The better class of summer hotels is swelling the "prospect" list of range distributors, and central stations are showing more interest in rate schedules designed to facilitate economical service in the heavy-duty line.

Increasing Electrical Sales by Ten-Cent and Chain Drug Stores

AN INTERESTING trend in the sales of cheap electrical merchandise now being sold in the five-and-ten-cent establishments and the chain drug stores of New York City is the practice of selling special parts of numerous articles at so many cents apiece. These sales are being made in increasing volume and affect the lamp, wire, fixture, bell-ringing transformer, signal system and radio markets particularly.

During the week silk-covered lamp cord of fair make was selling in the lowest grade stores at 5 cents for one foot, and cotton-covered lamp cord at 5 cents for two feet. Christmas-tree lamps from Japan in the shape of attractive fruit, animals, birds, etc., were selling at 10 cents, with individual sockets priced at 5 cents.

If one cares to search through the great number of parts of the average radio counter, he is able to find enough binding posts, wire, condensers, brass fittings, insulation, etc., at a few pennies apiece to make a radio receiving set which will operate satisfactorily if the tubes, batteries and receivers are purchased elsewhere. The newest practice for those who are not seeking quality but cheap quantity is to buy iron conduit boxes, iron fittings, switch plates, tubes of brass, parts of sockets, porcelain, all at 5 and 10 cents apiece, and place them together into push flush switches, portable lamps, wall brackets and other similar junk which will soon blow out fuses or fall apart.

In the chain drug stores are also found a few parts for assembling at home. Sales in those establishments run at cut prices and to foreign goods, which is causing the first-line manufacturers considerable concern. An electric coffee percolator of aluminum with black wooden handles was selling last week at $3.69, foreign irons at $1.50, curling irons, American made, at $1; table stoves, American and foreign made, at $1.50, and therapeutic equipment at from 25 to 50 per cent below the market price.

Most Interest in Buying Centers in Retail Trade of New York

EXCEPT for a natural growth in the retail end of the electrical business of New York City, the market is without particular feature. The largest volume of sales in the retail end is for the complete line of heating and cooking appliances, a situation which is expected to continue steady until late into December. On the other hand, orders for poles, high-tension insulators and the general line of wire have fallen off considerably during the last two weeks, jobbers and manufacturers report. Moreover, the identical irregularities that have been paramount in the market during the last three months are still present in different quarters. The wire market continues to fluctuate with the changing prices of the raw-material market, and insulator deliveries are still bothering normal progress in that market when orders are not secured by those who are able to deliver in the most satisfactory time.

Proposals for a reduction of federal taxes have occasioned wide favorable comment in the electrical business of this district, and a further gain in export trade has given encouragement to some of the interests. Other conditions affecting the buying power of the consumer are improved, and there is little non-employment at the present time.

Pace Quickens in New England Trade; Deliveries Satisfactory

IN BOTH heavy and light material the demand upon manufacturers and jobbers in the Northeast is steadily improving. With the exception of high-tension porcelain insulators, deliveries are generally satisfactory, although cable and radio equipment is none too plentiful. All signs point to a record-breaking appliance business in the approaching holiday season.

A tendency is apparent among contractors to buy flexible armored conductor in 2,500-ft. and 5,000-ft. lots instead of in smaller quantities. Wire is moving actively, both weatherproof and rubber-covered showing much life, and last week there was a perceptible stir in bare copper wire for up-country transmission-line use.

Building contracts in New England for the week ended Nov. 13 totaled $7,414,400, against $5,574,100 for the corresponding week of 1922, more than doubling any other corresponding week for twenty years. Slow improvement in textiles, a better tone in shoe manufacturing, a steady production in metal-working shops, busy retail trade, increasing central-station earnings and close control of inventories characterize general business. Widespread enthusiasm has been aroused by the federal income-tax reduction proposed by the Secretary of the Treasury.

Atlanta Jobbers Report Difficulty in Keeping Certain Stocks

GENERAL business conditions in the Southeast continues very healthy, and electrical jobbers report their business as entirely satisfactory. Deliveries have been good, and as a result stocks are in fine shape for the anticipated holiday trade.

Heating-device sales continue to be phenomenal, and several jobbers have had to reorder when they thought they had stocks sufficient to carry them through the holiday season. Owing to the very mild weather to date, air heaters have been in demand, and pres-

Comparative Prices of Station Supplies

	Current Price	Four Weeks Ago	One Year Ago
Soft steel bars, per lb.	$0.0354	$0.0354	$0.0304
Cold finished shafting, per lb.	0.0465	0.0465	0.039
Brass rods, per lb.	0.1475	0.1525	0.17
Solder (half and half), per lb.	0.31	0.295	0.275
Cotton waste, per lb.	.10 to .13	.10 to .13	.09 to .11½
Washers, cast iron (¼-in.), per 100 lb.	6.50	6.50	6.00
Emery, disks, cloth, No. 1, 6-in. diameter, per 100	3.38	3.38	3.02
Machine oil, per gal.	0.297	0.297	0.33
Belting, leather, medium, off list	30-10%	30-10%	30-10%
Machine bolts, up to 1-in. x 30-in., off list	40-10%	40-10%	40%

ent indications are that there will be no carry-over of this item this year.

Central stations and jobbers are pushing electric ranges, and as a result sales are excellent and the popularity of this item is growing steadily. The sales of ranges are reflected by a considerably increased business in the 10-kw. transformers, and jobbers report their stocks of this size transformer somewhat reduced. Meters of the 25-amp. and 50-amp., three-wire types are going well and reasonable stocks are on hand.

Sales of most classes of schedule material entering into construction work have been good, and jobbers experience some difficulty in keeping satisfactory stocks of certain items. This condition will doubtlessly continue to the first of the year as building construction throughout the terriotry has been very heavy. Several heavy orders for line material for both the 2,300-volt and the high-voltage types have been received by jobbers in the past ten days, and one jobber reports the receipt of one order for twenty-five carloads of 50-ft. to 70-ft. poles.

San Francisco Business Recovers; Excellent Industrial Orders

ELECTRICAL business in the industrial field is very good, as is evidenced by the brisk sale of such installation items as safety switches and other control apparatus. Building seems to be slackening in the San Francisco Bay region but holding up well in the interior, while it may set another high record in southern California. Retail business is very much better. The rainy season is deferred, but this condition as yet has not had any noticeable effect in the agricultural sections.

A recent two-car order for bare copper wire is reported for an irrigation project. Schedule-material business is excellent as more and more stocks are being replenished and certain new plugs and convenience outlets are being featured. Radio batteries are finding a more interested market.

Wire Base Unbalances Chicago Market; Active Conduit Sales

APPARENTLY there is considerable unrest in the Chicago electrical market this week. The advance in bare copper of a 1½-cent base in the last few days would appear to indicate that wire should shortly go to a higher level, at least to its previous figures. The increase in copper amounts to about 13 cents on No. 14 rubber-covered wire at its present price. While there has been no advance in rubber-covered wire as yet, jobbers and purchasers may find it advisable to give this commodity attention at this time. The same situation prevails in magnet wire, which is usually affected to a greater extent by the fluctuation of bare copper and cotton, both of which have been climbing lately.

There appear to be indications that certain interests which control the bare copper wire used by the rubber-covered manufacturers are seeking to establish a set price on such wire for all manufacturers. If this effort should be successful, the electrical industry will possibly see higher prices, with competition reduced considerably. There have been rumors of an advance in loom prices, but up to the present writing no such action has been announced; however, the conference of loom manufacturers this week, with the cotton market in a strong position, should have particular attention for this reason.

Sales of conduit, pole-line hardware and wiring devices have been very good. The intensified building activity in this vicinity keeps the demand up.

French Figures Show Electrical Manufacturing Developments

FRENCH government figures indicate a heavy increase in customs dues on general imports during the first eight months of 1923. This means increased general imports. The electrical industry follows the same course, but the increase in imports is slight as compared with the general average, while on the contrary French exports in the same industry show an increase of more than 41 per cent as compared with those of 1922 for the same period.

With respect to both imports and exports in general, where tonnage has decreased, values appear to have increased in almost every instance. This is notably the case with exports in this industry. The fact is perhaps explained with regard to imports by the shrinkage in the value of the franc as compared with a year ago, but it "jumps at the eyes" as the French view it when exports as well are concerned. It may be inferred that French manufacturing costs in the electrical industry have not been lowered, nor the export selling price either. The situation is anomalous.

Exports in the French electrical industry for the eight-month period were:

	1922		1923	
	Metric Tons	Value, Francs	Metric Tons	Value, Francs
Porcelains, glass, etc.	561	2,163,000	881	3,596,000
Arc and incandescent lamps	144	10,404,000	186	14,238,000
Wire and cables	2,429	28,419,000	1,828	22,675,000
Dynamos and parts	304	5,757,000	455	9,116,000
Electrical machinery and tools	1,578	16,966,000	1,548	17,574,000
Electrical and electrotechnical appliances	1,632	52,227,000	2,310	78,336,000
Batteries and parts	542	2,143,000	415	1,737,000
Total	7,190	118,079,000	5,623	167,272,000

Exports thus show a decrease of 1,567 metric tons and an increase in value of 49,193,000 francs.

Imports in the French electrical industry for the eight-month period were:

	1922		1923	
	Metric Tons	Value, Francs	Metric Tons	Value, Francs
Porcelains, glass, etc.	644	2,069,000	545	2,463,000
Arc and incandescent lamps	178	14,591,000	200	15,703,000
Wire and cables	68	973,000	95	3,583,000
Dynamos and parts	275	4,663,000	356	8,265,000
Electrical machinery and tools	3,636	32,121,000	2,642	31,225,000
Electrical and electrotechnical appliances	866	17,964,000	990	26,589,000
Batteries and parts	382	1,094,000	256	1,391,000
Total	6,049	73,475,000	5,084	89,219,000

Imports thus show a decrease of 965 metric tons and an increase in value of 15,744,000 francs.

Of the outstanding imports, those of dynamos and parts, electrotechnical appliances and wire and cables appear to be significant. The latter item shows a falling off in exports, while the two former have made notable advances in imports.

In all comparisons of these figures with those of the period before the war—above all, with regard to exports—it must not be ignored that the electrical industry of Alsace, which was formerly German but which is now French, cuts a big proportionate figure.

The Metal Market

THE feature in the non-ferrous metal market of the week is the spectacular and steady advance in the price of copper, which has risen about as rapidly as it declined just a few weeks ago. The lead and zinc markets have also improved, so that on the whole the markets have been cheerful ones for the producers. The improvements shown in New York prices have been accompanied by advances in London, despite the drop in sterling exchange. Both copper and lead are in good demand abroad.

NEW YORK METAL MARKET PRICES

	Nov. 14, 1923 Cents per Pound	Nov. 21, 1923 Cents per Pound
Copper, electrolytic	12.87½	13.00
Lead, Am. S. & R. price	6.75	6.85
Antimony	9.25	9.50
Nickel, ingot	27.00 to 32.00	27.00 to 32.00
Zinc, spot	6.35	6.40 to 6.45
Tin, Straits	42.05	43.00
Aluminum, 98 to 99 per cent	26.00 to 27.00	26.00 to 27.00

Zinc prices have improved slightly, carrying them to between 6.40 and 6.45 cents per pound East St. Louis. Sales have been fair to both galvanizers and brass manufacturers. Brass "special" was sold during the week at a premium of $2 per ton over the price of prime Western. Statistics of the American Zinc Institute for October show an increase in stocks of 2,894 tons. Production was 42,098 tons. Shipments were 39,204; stocks, Oct. 1, 22,893; Oct. 31, 25,787; shipped for export, 6,978. Producers look for a renewal of export demand in the near future.

Activities of the Trade

Devoted to News of the
Manufacturer, Jobber, Agent, Contractor and Dealer, Including Important Orders and Contracts for Apparatus and Equipment

Western Electric Publishes Miniature Newspaper in Chicago Press

In order to tell every Chicagoan something about the Western Electric Company, that organization is publishing twice a month a miniature newspaper in the daily newspapers. It was felt that, inasmuch as the company's employees and their families in Chicago number 120,000 persons, there must exist enough interest in the organization's work to warrant some paid space in the daily newspapers. This miniature newspaper is four columns in length and gives much information of a general nature regarding the development of Western Electric.

Altorfer Appoints R. W. Gorham

Announcement is made by the Altorfer Brothers Company, Peoria, Ill., manufacturers of "A B C" washing and ironing machines, of the appointment of R. W. Gorham as sales manager, effective Nov. 1, 1923. Mr. Gorham brings to the Altorfer company a background of wide experience, having been associated with "A B C" products for the last three years, and sales manager of several large electrical manufacturing companies of the industry in the East and Middle West.

Holland & Monaghan Established as Manufacturers' Agents

Holland & Monaghan, organized by H. Van Cott Holland and Owen Monaghan, who for many years were connected with the Thomas & Betts Company, New York City, manufacturers of conduit and conduit fittings, have established headquarters as manufacturers' agents at 30 Church Street, New York.

Super Safety Switch Enlarges Manufacturing Space

The Super Safety Switch Electric Company has recently completed a new building at 103d and Racine Streets, Chicago, in order to enlarge facilties to take care of the increasing demand for its products. Extra floor space capacity of 840 sq.ft. will allow the production of a complete line of switches ranging from 30 amp. to 200 amp.

H. J. Caffrey Opens Office as Manufacturers' Agent

Announcement is made of the opening of offices at 51 East Forty-second Street, New York City, by Harry J. Caffrey as a manufacturers' agent. For the past thirteen years Mr. Caffrey has been with the Manhattan Electrical Supply Company, New York City, first as outside salesman and later as manager of the company's Harlem store in West 125th Street. After four years at the Harlem store he was appointed district manager for the New England States, operating from Boston as headquarters.

New York Power Show to Include Material-Handling Equipment

Material handling equipment, electrically propelled, will be included in the National Exposition of Power and Mechanical Engineering to be held in the Grand Central Palace, New York City, from Dec. 3 to 8 inclusive. Conveyors, industrial trucks, elevators, hoists and large scales are on the list. The managers of the exposition are Fred W. Payne and Charles F. Roth, with offices in the Grand Central Palace. A list of 250 exhibitors has been issued.

Standard Underground Changes

The Standard Underground Cable Company, 100 Seventeenth Street, Pittsburgh, Pa., announces the following changes in personnel recently made in the Perth Amboy (N. J.) organization: H. W. Fisher has been advanced to technical director of electrical engineering, while continuing also as manager of the lead-cable and rubber departments. R. W. Atkinson has been appointed chief electrical engineer. G. J. Shurts has been made production manager of the lead-cable department.

Aladdin Appliance Firm Acquires Plant of Highlands Company

The Aladdin Manufacturing Company, Munice, Ind., manufacturer of electrical appliances, has acquired the plant and business of the Highlands Manufacturing Company, maker of kindred products, operating under a receivership for about two years. The new owner has construction in progress on new buildings and purposes to consolidate the works at this location and install additional equipment. George N. Spencer is president and William F. Spencer vice-president.

"Mercury" Truck Appoints Agent for Philadelphia Territory

The Mercury Manufacturing Company, 4118 South Halsted Street, Chicago, has granted an agency to Edmund Herbert Jahnz for its electric industrial tractors and trailers in the Philadelphia territory. Mr. Jahnz, whose office is at 2009 Market Street, was formerly with the United States Army and later with the Lakewood Engineering Company.

General Electric Contemplates Doubling Canadian Output

According to officials of the General Electric Company, the outputs of the recently acquired Canadian General Electric Company and the converting subsidiary, the Canadian Allis-Chalmers Company, will be doubled in the near future. It is estimated that the American company will spend more than $15,000,000 on the Canadian company, including the stock purchase, plant rehabilitation and working capital.

General Electric was particularly desirous of obtaining Canadian plants in order to manufacture for sale in the British Empire under the preferential tariff. It has already diverted an important British colonial contract to the Canadian company's Peterboro plant. Formerly the Canadian company was unable to use General Electric patents on Empire orders, while the American company was unable to sell any of its equipment in Canada except through the Canadian concern.

Enough Canadian stock has been purchased in the open market to insure completion of the transaction. While regret is felt over the loss of the Canadian identity, the Canadian plants had an unsatisfactory earning record and intermittent operation. President Dyment at Toronto says that with the output of the Canadian plants doubled they will be used largely for export business.

The O'Neil Manufacturing Company, 715 Palisade Avenue, West New York, N. J., will manufacture electrical equipment for the Audiphone Company of America, 39 Cortland Street, New York City. L. R. O'Neil is head of the company.

Landers, Frary & Clark, New Britain, Conn., manufacturers of electrical appliances, have awarded a contract for a new building of six stories to be erected in Torrington, Conn., this year.

The Fuller Gates Company, Hartford, Conn., recently organized with capital stock of $50,000 to manufacture electrical wiring devices, is about ready to start manufacturing. Fred P. Gates is vice-president in charge of operations.

The Independent Electric Supply Company, 59 Warren Street, New York City, has leased the five-story-and-basement building at 52-54 Murray Street and will occupy it for a new distributing plant and headquarters.

The Remy Electric Company, Anderson, Ind., will lay foundations at once for the construction of a one-story addition to its plant, totaling about 12,500 ft. of floor area, estimated to cost $25,000. It will be used entirely for manufacture.

The Newark Transformer Company, 71 Hamilton Street, Newark, N. J., has been organized to manufacture transformers, specializing in the smaller units up to and including 50 kw. The company has a plant equipped for this manufacture. D. J. Norton is president

Foreign Trade Opportunities

Following are listed opportunities to enter foreign markets. Where the item is numbered, further information can be obtained from the Bureau of Foreign and Domestic Commerce, Washington, by mentioning the number.

An agency is desired in Caracas, Venzuela (No. 8,174), for electrical appliances and supplies and for hydraulic machinery.

An agency is desired in Algiers, Algeria (No. 8,178), for electrical supplies.

Purchase is desired in Teheran, Persia (No. 8,145), for a three-phase, 50-cycle, 225-volt, alternating-current generator, driven by a 350-hp. Diesel engine.

Purchase is desired in Rio de Janeiro, Brazil (No. 8,165), for plates, positive and negative, for setting-up plates for storage batteries.

PROPOSED PLANS FOR THE ELECTRIFICATION OF CZECH RAILWAY.—The Ministry of Railways in Czechoslovakia is considering the electrification of the Prague-Kladno section of the Czechoslovak railways, according to the *Czech Hydro-Electric Herald*, and not of the Prague-Pilsen line, as has been previously reported. The first-mentioned line can be supplied at once with electricity from the power plant at Seestadtl, whereas the Prague-Pilsen road would at first have to obtain energy from the Prague power plants. The electrification of the latter is thus dependent on the carrying out of the Stechowitz dam and hydro-electric project.

ADDITIONAL ELECTRIFICATION OF RAILWAYS IN CHILE.—Work has begun, according to *Commerce Reports*, on the electrification of the Ferocarril del Llano de Maipo, which extends from Santiago, Chile, to Puente Alta. After the existing line is electrified the present rolling stock will be discarded and new equipment consisting of a freight locomotive and two electric passengers cars operated. Energy at 600 volts, direct current, is to be supplied by the Compañia Chilena de Electricidad, which will erect a substation at Bella Vista.

BLOEMFONTEIN POWER HOUSE AVAILABLE.—Two copies of a report on the power plant extensions at Bloemfontein, South Africa, to cost about £180,000, made by the consulting engineers, whose recommendations have been adopted, are available for loan on application to the Electrical Equipment Division, Bureau of Foreign and Domestic Commerce, Washington, D. C., by referring to file No. 108,909.

New Apparatus and Publications

DIESEL ENGINES.—The Fulton Iron Works Company, St. Louis, has issued catalog No. 805, describing the "Fulton-Diesel" engines.

ELECTRIC CLOTHES WASHER.—The Farmelectric Utilities Corporation, division of the Poole Engineering & Machine Company, Woodberry, Baltimore, has placed on the market an electric clothes washer with a capacity of eight sheets.

ELECTRIC HAND LANTERN.—A new electric hand lantern for use in factories and homes, and for railway men, etc., has been brought out by the Federal Electric Company, 8700 South State Street, Chicago.

ELECTRIC CLOTH-CUTTING MACHINE.—The Eastman Machine Company, Buffalo, has developed an electric cloth-cutting machine, model "UA," designed for garment, tent and awning manufacturers, upholsterers, etc.

ELECTRICALLY OPERATED CROSSING SIGNAL.—The Bryant Zinc Company, 600 Orleans Street, Chicago, has developed an electrically operated crossing signal, known as the "Magnetic Autoflag" model 5.

WASHING MACHINE.—A washing machine with a special heat-retaining tub known as the "Thermotub," has been placed on the market by the Boss Washing Machine Company, Cincinnati.

AUTOMOBILE LAMP.—The Lorraine Corporation, 341 East Ohio Street, Chicago, has developed the "Lorraine" controllable driving lamp, designed to fit every model of cars.

ADJUSTABLE GRINDER.—The Stow Manufacturing Company, Inc., Binghamton, N. Y., has brought out an adjustable grinder mounted on a truck.

FLOODLIGHT.—The Brieloff Manufacturing Company, 119 Lafayette Street, New York City, has placed on the market a new floodlighting unit for store windows.

ELECTRIC MOTORS.—The Reliance Electric & Engineering Company, Ivanhoe Road, Cleveland, has issued a booklet entitled, "Electric Motors—How to Choose and Use Them," which contains a few essential facts on electric motors and how to chose and use them to the best advantage.

LIGHTING DATA.—The Edison Lamp Works of General Electric Company, Harrison, N. J., is distributing bulletins L. D. 147, L. D. 148, L. D. 149, L. D. 150, entitled "Lighting for Traffic Control," Lighting Legislation," "Mazda Lamps in Photography" and "The Lighting of Steel Mills and Foundries" respectively.

New Incorporations

THE ONONDAGA (N. Y.) UTILITIES CORPORATION has been incorporated with a capital stock of $500,000 to generate and distribute electricity in Onondaga, Oswego and Madison Counties. The directors are: W. C. Pearce, 465 Allen Street, Syracuse; Ernest Johnston, attorney, 956 Lancaster Avenue, Syracuse, and C. E. Agan, 100 Bellevue Avenue, Syracuse.

THE COMFORT (TEX.) ELECTRIC LIGHT & POWER COMPANY has been incorporated with a capital stock of $16,000 by Otto Holekamp, A. S. Faltin and others.

THE POTOSI (MO.) LIGHT & POWER COMPANY has been incorporated with a capital stock of $10,000 by F. J. Flynn, H. L. White and others.

Construction News

Projects, Plans, Bids and Contracts, Contemplated or Under Way

New England States

BRUNSWICK, ME.—The Thomas Plow Company contemplates the installation of electric equipment in connection with proposed extension at its tractor-plow plant.

NEWPORT, N. H.—The New Hampshire Power Company has petitioned the Public Service Commission for permission to purchase the properties of the Newport (N. H.) Electric Light Company, the Sunapee (N. H.) Electric Light & Power Company, the Contoocook (N. H.) Electric Light Company, the Antrim-Bennington Electric Light & Power Company, the Canaan-Endfield Electric Company and the Hillsboro (N. H.) Electric Light & Power Company; also for authority to issue $1,200,000 in bonds and stocks to finance the project.

MONTPELIER, VT. — Permission has been granted to the Montpelier & Barre Light & Power Company to issue $450,000 in bonds, the proceeds to be used for improvements at the steam plant, work on which is under way, and for erection of high-tension transmission lines between the local plant and Barre.

HOLYOKE, MASS.—Contract has been awarded by the American Tissue Mills Company for the construction of a new power house on Crescent Street, to cost about $30,000.

SPRINGFIELD, MASS. — The Reed Realty Trust Company plans to build a new power house at 99 Cortland Street.

BRIDGEPORT, CONN. — The United Illuminating Company has engaged Westcott & Mapes, Inc., New Haven, engineer, to prepare plans for a new 30,000-kw. generating unit at its plant, foot of East Main Street, to double the output of the station. New switching equipment will also be installed.

Middle Atlantic States

BROOKLYN, N. Y.—Bids will be received by William H. Gompert, architect, Board of Education, corner of Flatbush Avenue Extension and Concord Street, until Nov. 26 for installing electric wiring and fittings in Girls' Commercial High School, on Classon Avenue.

BROOKLYN, N. Y.—Electric power equipment will be installed in the proposed plant to be erected by E. J. Trum, Inc., 55 Third Street, manufacturer of paper boxes, etc., at 764-66 Fourth Avenue, to cost $125,000.

BUFFALO, N. Y.—The Chevrolet Motor Company, Detroit, will install electric power equipment in its proposed local plant, to cost about $700,000, for which general contract has been awarded.

DEFERIET, N. Y.—The Northern New York Utilities, Inc., Watertown, has applied to the Public Service Commission for permission to build a steam-driven plant at Deferiet, to cost about $150,000. The equipment will include a 5,000-kw. turbo-generator. The company plans to purchase steam from the St. Regis Company.

LINOLEUMVILLE, S. I., N. Y.—The American Linoleum Manufacturing Company plans to erect a power plant, to cost about $80,000.

NEW YORK, N. Y.—Bids will be received by William H. Gompert, architect, board of education, corner of Flatbush Avenue Extension and Concord Street, Brooklyn, until Dec. 3 for installing electric wiring and fittings in new Public School 75, on Faile Street, borough of the Bronx.

NEW YORK, N. Y.—The New York Central Railroad Company is considering the construction of a large central substation in connection with the electrification of its system south of Spuyten Duyvil. The cost of the project, including line relocation is estimated at $20,000,000.

ONEIDA, N. Y.—The Adirondack Power & Light Corporation has been granted permission to extend its transmission line from Oneida into Lenox Township to furnish electrical service there.

ROCHESTER, N. Y.—The Public Service Commission has authorized the Rochester Railways Coordinated Bus Lines, Inc., to operate an electric bus line in the city.

WAYLAND, N. Y.—The Wayland Steuben Power Company has been granted permission to sell its electric service lines and other property in Wayland to the Wayland Light & Power Company.

JERSEY CITY, N. J.—Electric power equipment will be installed by the Continental Can Company, Fifteenth Street, in its proposed addition to cost $500,000, for which a general contract has been awarded.

KEARNY, N. J.—Electric power equipment will be installed in the addition to be erected by the Nairn Linoleum Company, Belgrove Avenue, to cost about $110,000.

BETHLEHEM, PA.—The Pennsylvania Power & Light Company plans to build a local substation, to cost about $125,000.

DUNCANNON, PA. — Application has been made to the Federal Power Commission by Frank M. Waring, Tyrone, and associates, for permission to build a hydro-electric plant on the Susquehanna River, near Duncannon, to cost about $350,000, including a transmission system.

McKEE'S ROCKS, PA.—The Pittsburgh & Lake Erie Railroad Company contemplates rebuilding the power house at its local shops, recently damaged by fire, with loss of about $25,000.

MIDDLETOWN, PA.—The Middletown & Swatara Creek Consolidated Water Company, now being reorganized under the name of the Middletown & Royalton Water Company, plans to build an electrically operated pumping plant on Swatara Creek.

PHILADELPHIA, PA. — Bonds to the amount of $440,000 have been voted for radio broadcasting stations and police signal systems.

PHILADELPHIA, PA. — The Walker, Huston, Penn-Huntingdon, Shirley-Huntingdon, Catherine, Lincoln-Huntingdon and Juniata Township Power companies are being organized by C. A. McClure, George W. Crowley, Jr., and F. E. Harshaw, to erect transmission lines in the respective districts for which they are named. James Collins Jones, Bullitt Building, Philadelphia, is representative.

PITTSBURGH, PA. — The West Penn Company has issued $4,000,000 in capital stock, the proceeds to be used to finance its electric light and power subsidiaries, for property extensions and other purposes.

VANDERGRIFT, PA.—The West Penn Power Company has acquired the local power plant and contemplates remodeling the plant and extending the transmission system.

AMCELLE, MD.—The American Cellulose & Chemical Manufacturing Company, Ltd., 15 East Twenty-sixth Street, New York, will install electric substation and power equipment in connection with a proposed new plant unit to cost about $500,000.

BALTIMORE, MD.—The Pittsburgh Plate Glass Company, Pittsburgh, will install electric power equipment at the proposed addition to its plant on Frederick Avenue, to cost about $120,000. Wight & Lockwood, Munsey Building, are architects.

BALTIMORE, MD.—Plans are being prepared for the construction of a new power house at the Children's Hospital, for which bids will soon be called. William G. Beecher, 12 East Pleasant Street, and Smith & May, Calvert Building, are associated architects.

BALTIMORE, MD.—The Standard Sanitary Manufacturing Company, Pittsburgh, plans to build a power house at its proposed local plant in the Canton section, to cost about $3,000,000. Samuel Diescher & Company, Farmers' Bank Building, Pittsburgh, are engineers.

INDIANHEAD, MD.—Bids will be taken at once by the local supply officer, Navy Department, for three transformers, single phase. (Y. and D. req. 1½.)

NORTH EAST, MD.—The Elk River Clay Products Company contemplates building a power house at its proposed local plant, to cost about $85,000.

CHARLESTON, W. VA.—The Pure Oil Company plans to install electric power equipment in connection with rebuilding its plant in the Cabin Creek section, which was recently damaged by fire with loss of about $100,000.

WELCH, W. VA.—Tentative plans are being considered by the Junior Pocahontas Coal Company for the rebuilding its power house, recently damaged by fire.

NORTHFORK W. VA.—The Flat Top Ice & Cold Storage Company is planning extensions to its electric lighting system in Clark.

COEBURN, VA. — The Lakeside Park Corporation is planning to install an electric light and power system on a local 300-acre tract to be developed for resort purposes, to cost about $225,000.

NORFOLK, VA.—Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until Dec. 4, for 189 electric soldering irons for the Norfolk and San Diego navy yards. (Schedule 1571.)

RICHMOND, VA.—Plans are under consideration for the installation of a hydro-electric plant, to cost about $150,000, to operate the pumping station of the waterworks system.

WASHINGTON, D. C.—Bids will be received by the general supply committee, Building F, Seventh and B Streets, Washington, D. C., until Dec. 3 for furnishing during the period Jan. 1 to June 30, 1924, certain supplies as described in specifications and proposals for Class 6, including electrical, engineering and plumbing supplies, for use by the executive departments and other establishments of the government in Washington, D. C.

North Central States

CASS CITY, MICH.—The Great Lakes Power Company has been granted a franchise to extend its transmission line to Cass City to supply electricity for the local municipal system. A substation will be built here.

HOUGHTON, MICH.—The Pampa Lumber Company contemplates rebuilding its mill and power house, recently damaged by fire, with loss of about $50,000.

MARQUETTE, MICH.—A special election will be held Dec. 3 to vote on the proposal to issue $275,000 in bonds for extensions to the municipal hydro-electric plant on the Dead River.

CLYDE, OHIO.—Bonds to the amount of $17,000 have been sold to provide funds for extensions and improvements to the municipal electric plant.

MOUNT STERLING, OHIO.—Plans are being considered for rebuilding the municipal electric light and water plant, recently destroyed by fire, to cost about $50,000.

YOUNGSTOWN, OHIO.—The Ohio River Edison Company is securing a right-of-way for a proposed electrically operated freight railroad from Toronto to Youngstown. The right of way parallels that of a high-tension transmission line to be erected by the company from the Toronto steam electric plant to Youngstown.

INDIANAPOLIS, IND.—Bids will be received by the Commissioners of Marion County, Indianapolis, until Dec. 10 for construction of administration building, two cottages, power plant and refrigerating plant for Colored Orphans' Home. D. Graham, Hune-Mansur Building, is architect.

CHICAGO, ILL. — The Commonwealth Edison Company, Middle West Utilities Company, and the People's Gas, Light & Coke Company, affiliated organizations, contemplate an expenditure of $65 000,000 for expansion and improvements during 1924.

CHICAGO, ILL.—The Illinois Power & Light Corporation has arranged for an increase of $4,124,700 in capital stock, part of the proceeds to be used for extensions and improvements.

MOWEAQUA, ILL. — Preliminary plans are being prepared by Holbrook, Greeley & Hanson, engineers, Decatur, for an oil-engine-driven electric plant in Moweaqua, including distribution system, to cost about $75,000.

WILLIAMSVILLE, ILL. — Permission has been granted to the Prather & Hill Company to operate in Williamsville, Sherman and Broadwell. The company has also been authorized to issue bonds for the purchase of the local public utility properties and for reconstruction of the systems.

BARABOO, WIS.—Negotiations are under way for the purchase of the local plant of the Wisconsin Power, Heat & Lighting Company, to be owned and operated by the municipality.

DE PERE, WIS.—Plans are under consideration for the installation of a lighting system on Fairview Avenue.

EAU CLAIRE, WIS.—Plans have been completed by the Wisconsin Telephone Company for the construction of underground conduits to replace its overhead cables. The company will also string new copper wire from Osseo to Whitehall to replace the iron-circuit equipment now in use.

FOND DU LAC, WIS.—The Wisconsin Industrial Commission has recommended the installation of better lighting facilities in all of the city school buildings.

JANESVILLE, WIS.—Plans are being considered by the Middle West Utilities Company, Chicago, for increasing the voltage of the transmission lines of the Janesville Electric Company from Janesville to Orfordville, and the power line of the Wisconsin Utilities Company from Monroe, Wis., to Winslow, Ill., from 33,000 volts to 66,000 volts. The capacity of the local substation will be increased. The Illinois Northern Utilities Company, a subsidiary of the Middle West Company, will erect a transmission line (66,000 volts) from Dixon, Ill., to connect with the new line to be erected from Monroe, Wis., to Winslow, Ill., which will make an interchange of power possible.

MERRILL, WIS.—The Wisconsin Valley Electric Company will soon start work on the construction of a dam and power plant on the Wisconsin River, about 3 miles above Merrill, at a site known as Rocky Carry, to develop 5,600 hp. Estimates are now being asked on waterwheels and generators.

RACINE, WIS.—The lighting committee of the City Council is considering a petition asking for an improved lighting system on Asylum Avenue.

SHEBOYGAN, WIS.—The Eastern Wisconsin Electric Company contemplates erecting a rural transmission line along the state trunk highway No. 17 from Sheboygan north to Cleveland, a distance of about 20 miles. As soon as this line is completed the company plans to extend its light and power lines from this city to all of the rural sections of Sheboygan County.

TRENTON, WIS.—The Trenton Light & Power Company, it is reported, plans extensions from its main line to furnish electric service to farmers in this territory. Energy is purchased from the Wisconsin Power, Light & Heat Company, Madison. Trenton has not a post office.

WESTFORD, WIS.—The Westford Light & Power Company plans to extend its electric light and power lines into the rural farming districts in this part of the state. Energy is secured from the Wisconsin Power, Light & Heat Company, Madison. Westford has not a post office.

GARY, MINN.—The Duluth Edison Electric Company plans to install an ornamental lighting system in the business section.

MINNEAPOLIS, MINN.—A permit has been granted the Northern Power Company to erect a substation at 1075 First Avenue North, to cost about $90,000.

OWATONNA, MINN. — Bonds to the amount of $350,000 have been voted to establish a municipal electric light, heat and power plant.

ROYALTON, MINN.—The Pike Rapids Power Company is perfecting plans for the construction of a 25,000-hp. hydro-electric plant at Blanchard Rapids, Mississippi River. A dam 42 ft. high will be built.

COUNCIL BLUFFS, IOWA. — The citizens have voted to grant the Citizens' Gas & Electric Company a new twenty-five-year franchise to supply electricity and gas in the city. Work has been started on improvements, to cost about $250,000.

WASHINGTON, IOWA.—Bids will be received by S. J. Kellogg, city clerk, until Dec. 6 for improvements to waterworks, consisting of brick building, electrically driven pumps, piping and equipment and a 200,000-gal. elevated tank. Arthur L. Mullergren, Gates Building, Kansas City, Mo., is consulting engineer.

MOUNTAIN GROVE, MO.—An election will be held Nov. 27 to vote on the proposal to issue $40,000 in bonds for an electric light plant.

BEATRICE, NEB. — The Dole Floral Company is planning to rebuild its power house, recently destroyed by fire with loss of about $35,000.

INMAN, NEB.—Bonds to the amount of $10,000 have been voted for the erection of a transmission line and $5,000 for a distributing system.

STAPLETON, NEB. — Bonds to the amount of $39,000 have been voted, of which $32,000 will be used for the erection of a transmission line and $7,000 for a distribution system.

Southern States

FRANKLINTON, N. C.—The Carolina Power & Light Company has acquired the property of the Franklin Light & Power Company and plans extensions.

GREENSBORO, N. C.—Bids will be received by J. F. Foust, president North Carolina College for Women, until Dec. 4 for construction of three dormitories, physical education building, dining hall, new wing and pavillion, including plumbing, heating and electrical equipment. The cost is estimated at $600,000. H. Barton, Greensboro, is architect.

MAXTON, N. C.—The Yadkin River Power Company has purchased the local property of the Carolina Electric Company and plans to make extensions to the system.

NORTH WILKESBORO, N. C.—Bonds to the amount of $85,000 have been approved for extensions to the municipal electric light and water systems.

WADEVILLE, N. C.—The installation of a community electric light plant is under consideration. Further information may be obtained by addressing the principal of schools.

DALTON, GA.—Arrangements are being made by the Georgia Railway & Power Company, Atlanta, for the construction of a third substation at Dalton. The station will have an output of 6,000 kw. and will cost about $60,000.

JACKSONVILLE, FLA.—Plans are being arranged by the Power Bureau for the construction of a substation on McDuff Street, to cost about $20,000.

ST. PETERSBURG, FLA.—Steps are being taken for the installation of an ornamental lighting system in the business district. The West Central Business Association is interested in the project.

SOUTH JACKSONVILLE, FLA.—Bonds to the amount of $500,000 have been voted for extensions to the electric lighting system, waterworks, sewers, etc.

WATERTOWN, TENN.—Plans are under consideration for the installation of electrically operated pumping machinery at the proposed municipal waterworks, to cost about $50,000.

AUBURN, ALA.—Plans are being prepared for a new engineering building at the Alabama Polytechnic Institute, to be provided with electrical and mechanical engineering departments, laboratories, etc. A fund of $300,000 is available for the project. Warren, Knight & Davis, Auburn, are architects.

BOAZ, ALA.—The Alabama Power Company has been granted permission to extend its transmission lines into the towns of Albertville, Boaz and Guntersville.

BUHL, ALA.—The Deal Lumber Company plans to rebuild its mill and power house, recently damaged by fire with loss of about $50,000.

MONTGOMERY, ALA.—The Montgomery Sand & Gravel Company, recently organized, contemplates the construction of a power house at its proposed local plant. H. G. Ireland is president.

TUSCALOOSA, ALA. — The Oak City Furniture Company plans to install electric power equipment at its proposed local plant, to cost about $50,000.

UNION SPRINGS, ALA.—The Cowikee Mills, Inc., Eufaula, plans to build an electric plant at its proposed local textile mill, to cost about $350,000.

JACKSON, MISS.—The Mississippi Power & Light Company, which has acquired electric systems at Vicksburg, Greenville & Columbus, Miss., is planning extensions, including new transmission lines.

HARRISON, ARK.—P. G. Walker, manager of the Carroll County Utility Company, has petitioned for authority to acquire the property of the Harrison Electric Company and for a franchise here. The construction of a plant, to cost about $150,000, is reported to be under consideration.

WESSON, ARK.—The Edgar Lumber Company contemplates rebuilding its power house and mill, recently damaged by fire with loss of about $150,000.

SAINT FRANCISVILLE, LA.—Steps are being taken for rebuilding the municipal electric plant and pumping station, recently damaged by fire.

BARTLESVILLE, OKLA.—The Bartlesville Gas & Electric Company has issued bonds for $246,000, as part of the proceeds to be used for extensions.

CANTON, OKLA.—Plans are being prepared for a municipal electric light and water plant, for which bonds have been voted.

PADEN, OKLA.—The Council is considering the erection of a transmission from Paden to Prague.

PAWHUSKA, OKLA.—Application has been made by J. A. Weisiogel for a franchise to supply electricity in Pawhuska.

SKIATOOK, OKLA.—The installation of an ornamental lighting system, to cost about $3,000, is under consideration.

BEAUMONT, TEX.—The Eastern Texas Electric Company contemplates erecting a power plant and distributing station here, to cost from $40,000 to $50,000.

PORT ARTHUR, TEX.—The installation of electrically operated pumping machinery at the municipal water plants in the Port Arthur Heights section is under consideration.

Pacific and Mountain States

TACOMA, WASH. — An ordinance has been passed appropriating $7 500 for the purchase of generator coils, lighting and other equipment for municipal service.

BURNS, ORE.—The Halhour Railroad Company, recently incorporated with a capital stock of $500,000 to build an electric railway from Burns to Seneca, a distance of 40 miles, plans to furnish electricity for light, heat and power. Frank Herrick, James Girard and Frank J. Klobusher are incorporators.

ENTERPRISE, ORE.—The Eastern Oregon Light & Power Company, Baker, it is reported, contemplates taking over the property of the Enterprise (Ore.) Electric Company.

KLAMATH FALLS, ORE.—The California-Oregon Power Company has purchased a site adjoining its present power plant on the Link River for a proposed new power house.

CHICO, CAL.—The Pacific Gas & Electric Company has submitted a proposal to the Council offering to install an ornamental lighting system on Main Street and Broadway.

HANFORD, CAL.—An ordinance granting the Southern California Edison Company permission to construct an underground transformer and to build underground conduits in the alleys of the business section has been approved by the board of trustees.

RIVERSIDE, CAL. — The Nevada-California Electric Corporation has issued $1,000,000 in bonds, part of the proceeds to be used for extensions and improvements.

SACRAMENTO, CAL.—Plans are being arranged for the installation of an ornamental lighting system on Orange Avenue, G, L, M, Mono and Cherry Streets. William Stranahan is city engineer.

SAN FRANCISCO, CAL. — The Pacifis Gas & Electric Company plans extensions to its substation at C and Jessie Streets, to cost about $87,000.

SAN JOSE, CAL.—The Guadalupe Portland Cement Company, Humboldt Bank Building, San Francisco, plans to build a power house at its proposed local cement mill, to cost about $1,000,000.

STOCKTON, CAL.—Bids are being received by Davis-Hellar-Pearce Company, Weber and California Street, construction managers for science building, dining hall and gymnasium auditorium, boys' dormitory and girls' dormitory, power house and stadium for the College of the Pacific. The cost is estimated at $600,000.

SALT LAKE CITY, UTAH.—Plans involving an expenditure of about $1,500,000 are under consideration by the Utah Power & Light Company. The proposed work includes the installation of a 20,000-kw. steam turbine at the Jordan steam plant, west of Salt Lake City. The company has applied for additional water rights on the Jordan River.

Electrical Patents

Announced by U. S. Patent Office

(Issued Oct. 30, 1923)

1,472,503. SWITCHING DEVICE; H. B. Taylor, Westfield, N. J. App. filed June 20, 1922. Switching device for automatic and semi-automatic telephone systems.

1,472,504. ELECTRIC HEATER; E. Thomson, Swampscott, Mass. App. filed March 15, 1921. Induction heater for steel tires or wheels.

1,472,506. TELEGRAPH SYSTEM; C. O. Van Der Vort, East Orange, N. J. App. filed Aug. 24, 1920. Relaying or repeating signal-current impulses from one circuit to another.

1,472,507. ARTIFICIAL LINE; H. J. Vennes, New York, N. Y. App. filed Dec. 28, 1921. For making transmission measurements of electrical circuits.

1,472,530. TELEPHONE ATTACHMENT; J. McComas, Los Angeles, Cal. App. filed Dec. 12, 1922. Combined sanitary cover, memorandum pad and advertising device.

1,472,532. CLOCK MECHANISM; M. Piciotti, Paterson, N. J. App. filed Jan. 7, 1922. Electrically operated clock.

1,472,545. ACTUATING MECHANISM FOR MAGNETOS; P. Brown, Springfield, Mass. App. filed Aug. 5, 1921. Means for retarding spark.

1,472,546. TRIP FINGER FOR MAGNETOS; P. Brown and I. E. Hendrickson, Springfield, Mass. App. filed Dec. 28, 1922. Means for retarding spark.

1,472,561. HAIR WAVER; W. C. Haberkamp, Chicago, Ill. App. filed March 4, 1922.

1,472,581. WELDING ELECTRODE HOLDER; J. Britt, New York, N. Y. App. filed Jan. 10, 1922. Electrodes of different diameters easily and quickly secured.

1,472,583. METHOD OF MAINTAINING ELECTRIC CURRENTS OF CONSTANT FREQUENCY; W. G. Cady, Middletown, Conn. App. filed May 28, 1921. For radio testing or measurement work.

1,472,585. MULTIPLEX SIGNALING SYSTEM; E. H. Colpitts, East Orange, N. J. App. filed July 9, 1919. Means for repeating signals between high-frequency multiplex line and low-frequency circuits.

1,472,595. CALLING DEVICE; J. T. E. Hillhouse, New York, N. Y. App. filed Dec. 24, 1920. Impulse sender for automatic telephone systems.

1,472,604. AUTOMATIC TELEPHONE SYSTEM; T. Lenaghan, Croydon, England. App. filed April 28. 1920. Automatic or semi-automatic operation obtainable.

1,472,610. TRANSMISSION CIRCUITS; R. C. Mathes, New York, N. Y. App. filed Dec. 4, 1919. Two-way repeating system.

1,472,631. MAGNETIC COIL; H. N. Bowman, New York, N. Y. App. filed Feb. 24, 1921. Variable-reactance coil.

1,472,639. INDIRECT LIGHTING UNIT; W. A. Dorey, Newark, Ohio. App. filed Nov. 6, 1920. Double reflecting prisms.

1,472,696. MOUNTING LAMP SHADE; S. R. Schwartz and A. Bostroem, New York, N. Y. App. filed Nov. 17, 1920. For portable lamps.

1,472,704. PERCOLATOR AND ELECTRIC HEATING ATTACHMENT FOR THE SAME; A. Ward, Norfolk, Va. App. filed April 20, 1922. Removable heating element so that percolator may be used on stove.

1,472,718. AUTOMOBILE SIGNAL; I. G. Holland and G. A. Broughton, Norfolk, Va. App. filed Sept. 26, 1919. Rear direction signal.

1,472,750. BURGLAR ALARM; J. F. Gorman and F. C. Gorman, New York, N. Y. App. filed Dec. 13, 1921. For sales.

1,472,762. ELECTRIC IRON; Y. Moore, Indianapolis, Ind. App. filed Sept. 20, 1921. Heating element made of preformed helical coils.

1,472,764. TIRE-WRAPPING MACHINE; J. Scherner, Milwaukee, Wis. App. filed Aug. 4, 1921. Motor-driven.

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1,472,779. THERAPEUTIC APPLIANCE; F. A. Anderson, Milton, Wis. App. filed July 6, 1920. Lamp adapted for therapeutic treatment by radiant energy.

1,472,781. WELDING OR SOLDERING COMPOSITION; A. Baewskin, Chicago, Ill. App. filed Feb. 17, 1923. For gold, silver and their alloys.

1,472,787. KEY; E. A. Bohlman, Chicago, Ill. App. filed Oct. 11, 1920. For selective telephone party-line ringing.

1,472,788. REGULATOR FOR GENERATORS; A. F. Brotz, Kohler, Wis. App. filed Aug. 4, 1921. Governor for internal-combustion-engine-driven farm lighting and power units.

1,472,818. BRUSH TRIPPING DEVICE; L. R. Waller, Westmount, Quebec, Canada. App. filed Dec. 2, 1920. For selector panels of automatic telephone system.

1,472,821. RINGING CHANNEL FOR MULTIPLEX TELEPHONE SYSTEMS; H. A. Affel, Brooklyn, N. Y. App. filed July 29, 1919. By means of carrier current.

1,472,822. CALLING ARRANGEMENT FOR RADIO SYSTEMS; H. A. Affel, Brooklyn, N. Y. App. filed Sept. 24, 1919. Ringing or call signal employed with radio telephone.

1,472,824. PLANER AND SYSTEM OF MOTOR CONTROL THEREFOR; H. L. Blood, Plainfield, N. J. App. filed June 10, 1920.

1,472,829. CARD-PERFORATING MACHINE; J. H. Gault, Philadelphia, Pa. App. filed April 17, 1922. By magnet punches.

1,472,844. POWER TRANSMITTING MECHANISM; A. C. Keller, Milwaukee, Wis. App. filed Oct. 20, 1919. For electrically operated cranes and hoists.

1,472,849. FORWARDING SYSTEM FOR OCEAN CABLES AND THE LIKE; W. H. Martin, New York, N. Y. App. filed June 18, 1918. Combined telegraph and ocean cable system.

1,472,899. CONSTRUCTION FOR INTERNAL-COMBUSTION ENGINES; R. S. Blair, Sound Beach, Conn. App. filed May 9, 1919. Manifold heater.

1,472,914. RHEOSTAT; L. Kebler, Bronxville, N. Y. App. filed March 23, 1920. Dust, dirt and moisture proof.

1,472,923. CELL CONNECTOR FOR ELECTRIC BATTERIES; L. Lyndon, New York, N. Y. App. filed Oct. 4, 1921. Demountable type for storage batteries.

1,472,987. SIGNALING SYSTEM; P. B. Murphy, Nyack, N. Y. App. filed Aug. 28, 1920. Modified carrier-wave system over telephone toll line.

1,473,002. WATER HEATER; J. H. Beckman, Oakland, Cal. App. filed March 9, 1921. Radiator type.

1,473,015. MOTOR-DRIVING MECHANISM; J. S. Coldwell, Milwaukee, Wis. App. filed May 10, 1919. Electromagnetic brake for motor.

1,473,060. METHOD OF ELECTROPLATING; E. N. Taylor, St. Louis, Mo. App. filed Dec. 17, 1921. Article rapidly moved at intervals to remove gas bubbles.

1,473,070. GAP; S. T. Woodhull, Medford, and G. J. Waller, Somerville, Mass. App. filed Sept. 15, 1919. Spark gap of quenched type.

1,473,107. RESISTOR; M. M. Kohn, New York, N. Y. App. filed Feb. 3, 1921. Tube resistance of graphite and silicon carbide.

1,473,108. BATTERY-PLATE-TREATING APPARATUS; J. M. Lea, Detroit, Mich. App. filed Dec. 27, 1921. Liquid under pressure penetrates permeable paste supported by grid.

1,473,167. ELECTRIC DRIVE MECHANISM; C. S. Weyandt, Pittsburgh, Pa. App. filed Nov. 20, 1919. Reciprocatory motor for hammers, drills, etc.

1,473,179. METHOD FOR ELIMINATING UNDESIRED IMPULSES; R. A. Fessenden, Chestnut Hill, Mass. App. filed Nov. 10, 1920. Eliminating static in signaling circuits.

1,473,206. BEARING LINE FOR ELECTRIC AERIAL CONDUCTORS TO AUTOMOBILE MACHINES; H. S. Cassel, Stockholm, Sweden. App. filed Sept. 21, 1922. Gathering-reel trolley conductor for farm implements.

1,473,212. AUXILIARY SWITCH FOR AUTOMOBILE LIGHTS; O. L. Davis, Iowa City, Iowa. App. filed Oct. 13, 1920. Auxiliary lamp beneath mud-guard lights when headlights are dimmed.

1,473,220. RADIOTELEGRAPHY SIGNALING SYSTEM; H. F. Elliott, Palo Alto, Cal. App. filed Aug. 23, 1921. Uniwave signaling system for high-power stations.

1,473,224 and 1,473,225. SWITCH MECHANISM; D. D. Gordon, Chicago, Ill. App. filed April 20, 1918. Lamp socket and switch.

1,473,243. MEANS FOR MAINTAINING EBULLITION; R. D. Mershon, New York, N. Y. App. filed July 20, 1921. In electrolytic condensers.

1,473,255. MAGNETO; W. E. Schwarzmann, Longmeadow, Mass. App. filed Dec. 23, 1920. Driving mechanism.

1,473,292. ELECTRIC TYPEWRITING MACHINE; E. H. Hebern, Oakland, Cal. App. filed Sept. 8, 1919.

1,473,362. CONNECTOR; R. E. Tilton, Columbus, Ohio. App. filed March 3, 1921. For connecting cable or conduit to outlet box.

1,473,363. PHONOGRAPH; E. J. Tomlinson, Newark, N. J. App. filed Jan. 8, 1920. Electrically driven.

1,473,380. LAMPSHADE HOLDER; J. Peterson, Faribault, Minn. App. filed March 6, 1922. Holder furnishes handle by which lamp may be moved.

1,473,385. BUS STRUCTURE; A. M. Rossman, Chicago, Ill. App. filed May 10, 1920. Buses in form of totally inclosed cables.

1,473,407. LOOSE COUPLER ON RECEIVING COIL; L. W. Hatch, Stamford, Conn. App. filed Oct. 3, 1922.